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THE UNIVERSITY OF ALBERTA

# COST BENEFIT ANALYSIS OF PRIVATE RETURNS TO UNIVERSITY SCHOOLING

by

(C) JUSTINIAN C.J. GALABAWA

A THESIS

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OF DOCTOR OF PHILOSOPHY

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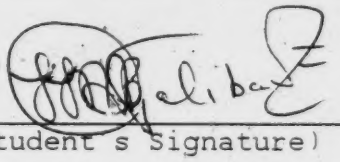

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*Dedication*

*To my late Grandparents,*
*Joseph Galabawa and Christina Mukataiwa,*
*who paid for my fees and other school expenses*

## ABSTRACT

The purpose of the study was to make a cost benefit analysis of private returns from selected degree programs offered by the University of Dar-es-Salaam. The study compared the private costs, private benefits, net present values of benefits and the private rates of return by degree programs, gender and work experience.

The human capital investment perspective guided the survey of the literature and provided the study's theoretical framework. Critiques of the human capital perspective were also reviewed.

Both cross-sectional and time series pay scale data were used and compared. Data were collected by means of questionnaires, data sheets and interviews. The cross-sectional sample consisted of 300 respondents. Of the respondents, 209 (69.9%) were males, while 91 (30.1%) were females.

The analysis involved making economic comparisons of private costs and benefits by degree programs, gender and pre-university work experience. Average costs and earnings by gender and experience were compared by use of t-tests and one-way analysis of variance. Degree programs were ranked by net present values and private rates of return.

The major findings of the study were the following: (a) Private direct expenditures in various degree programs were low, and private returns were high; (b) opportunity costs for the various degree programs were high; (c) law and arts graduates had higher earnings than graduates of other degree programs and the government pay scale earnings expectations; (d) degree programs with high net present values (i.e. medicine, engineering and science) had low private rates of return and vice-versa; (e) the differences between average earnings of men and women were statistically significant at $p = 0.05$ and in favour of men; (f) women had higher net present values and higher private rates of return than men; (g) work experience after obtaining a degree was a better predictor of earnings than age; and (h) work experience before joining university appeared to increase the net present values, however it appeared to decrease the private rates of return.

Generally, the study findings suggest caution against the practice of narrow manpower planning in response to a particular socio-economic predictor without taking into consideration the monetary benefits and career preferences of individual students.

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However, the customary absolution stands relieving all the persons and organizations mentioned above of responsibility for the research undertaken and the reporting of it.

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# CHAPTER I

# THE PROBLEM

## Background to the Problem

The impetus for this thesis arose from the need to study and analyze some of the factors that influence students to seek places in the various degree programs offered by the University of Dar-es-Salaam, Tanzania. Available evidence indicates that, during the academic year 1985-1986, about 6,543 students sought admission to the University, yet only 1,225 were offered places (University of Dar-es-Salaam Admissions Office Files, 1987). These figures show that there was an excess demand for university education. In fact, there has always been an excess demand for university-level schooling in Tanzania when the numbers seeking admission are compared with the number of university places available (Ministry of Education, Basic Facts on Education, 1986).

Usually the basic entry requirement for the various university programs consist of at least two principal passes at the National Advanced level Certificate of Education or its equivalent, including passes in Political Education and a General Paper.

In addition to receiving free board and lodging, university students have their tuition and transport paid for by the government. By 1987, students were getting an upkeep allowance of 800 Tsh. per month, plus an annual book allowance. The total institutional unit costs incurred by the government to support a university student for a year were 72,000 Tsh. in 1987. This figure is substantial when compared with the primary and secondary school level figures which were 13,500 Tsh. and 18,750 Tsh., respectively.

University schooling is an attractive investment alternative for Tanzanian youth. For example, among university graduates, unemployment is very low because there is guaranteed employment in one of the public institutions upon graduation. The Manpower Allocation Committee of the Ministry of Manpower and Development is responsible for this task.

The above picture is not surprising because the Tanzania national development plans reflect a belief in the human capital theory which takes schooling to be a form of investment in human beings. Large public expenditures on university schooling have been justified on economic grounds, namely, they provide skilled manpower for economic growth. But strict adherence to the manpower approach to university schooling in order to achieve national economic growth alone may run counter to private economic objectives

of graduates. Among these individual is the maximization of expected future private returns from more years of schooling.

In this study, we take up the general dictum that university schooling can be considered by students as a form of investment in their future earnings power. The returns that accrue to different degree programs may act as extrinsic motivators for individual choices. One approach to resolving the conflict between individual choice and to social objectives of the nation is to seek a balance between these two goals which might be achieved through rates of return analyses on educational investment.

Previous research studies on Tanzania's educational system have centered on: the teaching process and the pupils' academic achievement (Mmari, 1972); the distribution of educational opportunities (Mbilinyi, 1972; Malekela, 1983); the evaluation of education policies (Nkonoki, 1972); language problems associated with the learning processes (Mvungi, 1982); the role of the community and rural social change in relation to education (Ishumi, 1972; Lawuo, 1977; Kinshaga, 1985); and studies related to curriculum (Meena, 1982; Chonjo, 1985).

The above list of studies represents a sample of research related to education that has been done in Tanzania. These researches have fallen short on studying the pattern of monetary incentives and the role of these

incentives in determining both career choices of households and the effectiveness of government manpower plans which neglect individual preferences. A small cluster of studies mainly by donor agencies such as the World Bank, United Nations Educational Scientific and Cultural Organization (UNESCO), the Swedish International Development Agency (SIDA), and a few foreign individuals (Jee-peng Tan, 1985; Psacharopolous, 1984) have focussed on the analysis of social and private costs of secondary schooling in Tanzania. A gap still exists even in this cluster of studies regarding the role of economic factors in determining individual career choice. Economic factors might be of considerable importance in determining the level of demand for places in university degree programs. University level education, which is a matter of free choice, may be more responsive to economic incentives and therefore the demand for it may be reflected in the amounts of private returns accruing to different degree programs.

## The Theory of Human Capital

One of several perspectives for the evaluation of educational economic goals at both the individual and society levels is human capital theory. Taking this perspective, expenditure on education is not treated as a consumer item; instead, it is an investment. All differences in productivity between individuals can be

scaled along a single dimension--the difference in human capital possessed by the individuals. The means by which an individual acquires this human capital are in schooling and post-school investment and on-the-job training (Becker, 1965; Mincer, 1970). The theory argues further that:

> . . . increased investment in human capital increases individual productivity and income, and concurrently lays the technical base for the type of labour force necessary for economic growth in a modern industrialized society. (Schultz, 1963, p.x)

Accordingly, educational spending is an individual and societal investment yielding positive rates of return both to the individual and to society in general. The measurement of returns and their subsequent values can serve as indicators of education performance. On the other hand, better allocative decisions could be made within the education sector if the returns accruing to different levels of schooling or program alternatives are known, compared, and utilized in making decisions. Perhaps the most important aspect of rate of return analysis is the following:

> It provides a conceptual framework for the examination of the costs of education in relation to the relative earnings of educated manpower.... These elements have been neglected in some educational planning exercises based solely on forecasts of manpower requirements or social demand. (Woodhall, 1970, p. 47)

Several tools are available for comparing the costs and benefits of education. One of these tools is the investment approach. The investment approach assumes that:

> The benefits derived from the educational process are described only as the increase in lifetime earnings attributable to training received through education. (Duke et al., 1972, p. 205)

Investment analysis through a cost benefit approach or, as it is also called, a rate of return study treats education as a form of investment in human capital, the same as investment in stocks or property. The end product of this procedure is ". . . a rate of return to education. That is, every dollar invested in educational activity yields a certain rate of return or interest in the future" (Duke et al., 1972, p. 206).

Rate of return analysis has been used to support a theory of private demand for education. According to this interpretation:

> . . . the "rational" person will invest in education up to the point where the internal rate of return to that level of education is equal to the rate of interest which reflects his subjective time preference. (Sheehan, 1972, p. 41)

As a consequence of the above interpretation, it is possible to derive a demand schedule for the individual. The higher the interest rate, the smaller the amount of education demanded; lower interest rates lead the rational individual to demand more education. The total societal demand for education is a summation of individuals' demand schedules.

The above perspective is expanded upon in the literature surveyed for this study. However, it is

necessary to mention some criticisms of human capital theory. The proponents of labour market institutional models criticize the theory for assuming that the labour market is homogeneous, that the general laws of investment and the returns to human capital apply equally to all individuals in the labour market. A prominent force in this critique is Carnoy (1979) who argued that:

> The human capital theory has problems explaining earnings differentials between men and women, Blacks and Whites, Indians and Creoles, Europeans and Natives, and those from different social class background with ostensibly the same amount of human capital. (p. 8)

Other authors such as Barough and Streeten included in their critique the argument about imperfect labour markets that:

> Much of the higher earnings is not a return on education but a monopoly rent on: (1) the scarcity of parents who can afford to educate their children well; and (2) the restrictions in members permitted into a profession in which existing members have a financial interest in maintaining scarcity. (Barough and Streeten, 1963, p. 102)

In fact, despite the above objections, the rate of return analysis does not assume that all markets are always competitive. Rate of return analysis can be used to test the hypothesis that labour markets are competitive or not. Blaug indicated how this can be done when he argued that:

> The notion that a relatively high rate of return to education and training in some professions is due simply to monopolistic restrictions on entry can be verified by a rate of return comparison between professions with similar educational

> qualifications but different entry restrictions. (Blaug, 1965, pp. 229-230)

Human capital theory has been used extensively in research to update knowledge in the economics of education. The present state of our knowledge in the economics of education indicates the following among others: (a) that the returns to investment in education are generally high, particularly at the lower levels of schooling and in less advanced countries; (b) that the private returns are higher than the social returns; (c) that the degree of substitution between educated labour is on the high side; and (d) that education has something to do with the way income is distributed in society (Psacharopoulos, 1975, p. 175). One of the topics about which we are doubtful is the variation of private returns to schooling by fields of specialization.

## Statement of the Problem

This study was designed to investigate the following problem:

> What are the private costs, private benefits, net present values and private average returns to investment in selected undergraduate degree programs offered by the University of Dar-es-Salaam?

In particular, the study had the following aims:

1. To identify the main private costs and benefits facing a potential student by degree programs, gender and nature of entry into university;
2. To construct age (experience) earnings profiles by degree programs and gender;
3. To combine private costs and private benefits by use of basic economic measures so as to establish net present values and average private internal rates of return by degree programs; and
4. To provide some evidence concerning the validity of human capital theories within the context of the Tanzania setting.

## Statement of Sub-problems

For each aim of the study, a number of specific sub-problems were investigated.

### Sub-problems Relating to Private Costs and Private Benefits

1. How do direct private costs and indirect private costs compare across the degree programs?
2. How do direct private costs and indirect private costs compare by gender and nature of entry into university?

Sub-problems Relating to Age (Experience) Earnings Profiles

1. What is the pattern of age (experience) earnings profiles by degree programs?
2. What is the pattern of age (experience) earnings profiles by gender?

Sub-problems Relating to Present Values and Private Returns

1. What are the net present values of benefits for each degree program?
2. What are the net present values of benefits by gender and students' nature of entry into university degree programs?
3. How do the average private returns vary by degree programs, gender and students' nature of entry into university degree programs?

## Significance of the Study

Like any other social science research, the contribution of this study is expected to be the generation of new knowledge, in this case, in the area of private returns to schooling. Private returns have an influence on individual career choice behaviours; in fact, researchers (Carnoy, 1967; Blaug, 1965; Wilkinson, 1966) have postulated the existence of a rational calculus of educational and occupational choice. Therefore, the

calculations of private costs, present values and average private returns by degree programs may shed light on what is happening in the labour market vis-à-vis individual educational choices and rational economic decisions.

Secondly, this study has a methodological significance. Wilson's (1970) study on private returns to baccalaureate education investigated the financial returns to Alberta males who undertook education in engineering, arts, science and education through a cross-section survey. Dupuis' (1968) study of the rate of return on investment in graduate studies in Educational Administration was cross-sectional and based on individual statements provided by the subjects. Other studies by Thias and Carnoy (1962), Blaug (1965) and Eckaus (1973) were based on disaggregated cross-section surveys. Studies which did not use cross-section surveys include: Smith and Benett (1967), who used longitudinal earnings data in a Uganda study; and Hinchliffe (1969), who calculated rates of return estimates for the western region of Nigeria using government pay scales. Heyneman's (1980) study on Malawi was based on an ex-post tracer study of graduates. What is missing in these studies is a comparison of the findings given by the cross-section surveys with those findings from longitudinal pay scales data. A comparison of the findings from these approaches is important in countries such as Tanzania where government pay scales are usually adjusted to reflect

inflation, cost of living trends and trade union pressure rather than supply and demand conditions.

## Assumptions

Part of this study was based on public sector pay scales data. Also, earnings and costs data were collected from individual graduates by use of questionnaires and interviews. It was assumed that both the government statistics data and the answers given by the respondents represented the real figures of costs and benefits.

The public sector is the major employer of university graduates in Tanzania. Parallel to this public sector, a flourishing private sector employs some university graduates. It is assumed that the private sector has an influence on public sector salaries. Otherwise, public sector university educated employees would likely turn away and join the high-paying private sector. Since this situation is not occurring on a large scale, there must be a correcting influence which ensures wage and productivity comparability across the two sectors.

As pointed out in the literature surveyed, schooling remains a major determinant of modern sector earnings in most low-income countries (Carnoy and Thias, 1969; Heyneman, 1980). It was assumed, therefore, that the portion of earnings differential due to university schooling, and not to ascriptive characteristics, in low-

income countries such as Tanzania is higher than that for the high-income countries. This assumption permitted the use of a higher value of alpha coefficient than the conventional 0.66 value.

As a corollary to the above schooling and earnings relationship, it was assumed that the possibility of obtaining a job in the Tanzania public sector is determined by individual certification and school specialization. Therefore, while unemployment rates tended to be higher among primary and secondary school leavers, they were very low among university graduates. In fact, employment of university graduates is automatic after graduation.

Research studies conducted in the high-income countries made assumptions about differential career patterns, i.e. part-time work, evening jobs, summer jobs (Wilkinson, 1966; Dupuis, 1968; Maliyamkono, 1974). The situation in Tanzania looks a bit different. Most university students spend their vacation with their families on the farms or in villages. A few students, especially those from high socio-economic status families, spend their vacation in town with their parents or relatives. In both cases, however, students engage in family manual work, e.g. weeding, picking coffee or cotton, or other manual labour such as local beer brewing. The monetary returns from these activities, although substantial, are difficult to measure and quantify. The

contribution of different career patterns to opportunity costs was therefore assumed to be negligible.

The study computed average private internal rates of return. It was assumed that the private costs at the primary school level were minimal. This is because, in Tanzania, primary school pupils are usually very young and primary education is both free and compulsory. For this reason, foregone income has no meaning when applied to primary school pupils in the country.

## Delimitations

Wilson (1970) argued that the placing of limits on a study is usually dictated by both the questions asked and the availability of suitable data for analysis. Essentially, the present study was a comparison of private economic returns to higher schooling across several fields of specialization at university. It was delimited to the types of undergraduate degree programs deliberately chosen, namely: three year programs, i.e. B.A. (Education), B.A. (General), B.Sc. (Education), B.Sc. (General), LL.B. (Laws), B.Sc. (Agriculture); a four year program, i.e. B.Sc. (Engineering); and a five year program (Doctor of Medicine).

This study was concerned with an economic analysis of private monetary returns. It excluded consumption benefits or costs and the nonpecuniary benefits or costs of

chosen degree programs which are only accessible to university graduates. Only the private or individual benefits (earnings) and total costs (direct and indirect) were taken into account. Spill-over benefits, hedging benefits (value of the ability to deal with disequilibria) and other non-labour market returns were left out of the analysis.

## Limitations

The size and representativeness of the sample limits the conclusions and generalizations that can be drawn from the findings. The generalizations are limited to graduates of the degree programs studied. Applying the findings of this study to graduates of other degree programs or careers not requiring a university degree would not be justifiable.

The public sector pay scale earnings data provide a national picture and, therefore, the findings from this part of the study can be generalized within Tanzania. However, the cross-sectional earnings data were drawn from a small proportional sample of university graduates and, therefore, the conclusions and recommendations are relevant only to the sample studied.

## Definitions of Terms

A number of terms relevant to the study are defined below. Others are defined in chapters where they are used.

Earnings. Earnings are defined as the money income which individual graduates of the studied degree programs receive in the form of salaries for services rendered to their employers. This definition excludes gifts, loans, money acquired through ownership or sale of property, and income from extra occupational labour.

Private costs. Private costs are defined as monetary payments incurred by the students or their families in purchasing educational services. Two categories of private costs are relevant:

1. The private direct costs which are defined as the sum total of individual tuition costs, fees, and monetary living expenses incurred.
2. The private indirect costs which are defined as the earnings foregone by the graduates while undergoing university schooling.

Private benefits. Private benefits are defined as the monetary returns which accrue to an individual as a result of investment in schooling. These benefits are represented by the annual earnings after tax.

Present values. The present values of costs and benefits are defined as the discounted monetary values of

the incurred costs or the discounted monetary values of future benefits.

Internal rate of return (I.R.R.). The internal rate of return is defined as the discount rate which equates the present values of benefits and the present value of costs. In this study, private costs and private benefits were used in computing the internal rate of return and therefore it is called the "private internal rate of return."

## Summary

This chapter has defined the problem studied by giving the following: the background to the study, the human capital perspective on which the study is based, the sub-problems, the significance of the study, the assumptions and the definitions of selected terms.

Further theoretical issues on human capital theory and some related terms are given in the next chapter.

# CHAPTER II

## UNIVERSITY SCHOOLING AS INVESTMENT: A SURVEY OF THE LITERATURE

### Introduction

The purpose of this review is to show that there is enough evidence that university schooling and education in general can be considered as investment by the individual and society. Education, therefore, contributes to increased productivity. In this case, the first section of this survey will attempt to show that economic investment analysis tools, like the internal rate of return approach, can be used with modifications to evaluate education performance in the low income countries (LICs).[1] In the second section of this chapter an attempt will be made to identify the utility of previous internal rate of return studies. Finally, the survey will close with a list of research gaps which may be filled by this study and other research.

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[1]This does not mean that there are no other approaches. The approach selected depends on the "goal area" being evaluated. The goal area in this case is "education and the economy." Other goals may be equality of educational opportunity, transmission of knowledge and skills, or the quality of life.

## Education: Investment or Consumption

University schooling, like other forms of education, can be regarded as individuals' private investment, consumption, waste or drag. There is still much controversy and uncertainty surrounding the separation of consumption and investment aspects of university schooling. A definition which attempted to differentiate the two aspects was given by Fritz (1962) when he observed that:

> They are consumption to the extent that they give immediate satisfaction to the pupil or student (e.g., the joy of learning) or to others (e.g., mothers enjoying the peaceful hours while youngsters are at school). They are investment to the extent that they create either future satisfaction or future gains in productivity. (Fritz, 1962, p. 109)

The above educational efforts may be a waste to the extent that, sometimes, they may contribute neither to satisfaction nor to increases in future productivity. In extreme situations, they may be a handicap. This last unfortunate situation arises when school graduates' preferences and labour market employment opportunities become incompatible.[2] However, the fact that educational efforts can sometimes be misdirected does not invalidate

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[2]In fact, the consumption benefits of education are affected by changing tastes which are also related to schooling. The value of university schooling is surely different ex-post. Yet it is ex-ante judgements that determine individual choices.

the fact that part of that education increases private future satisfaction and, therefore, is an investment which can influence individual decision making.

## Social Demand vis-à-vis Private Choice

The national policy documents of most LICs and of Tanzania in particular support the view that education is a social investment. The philosophy and policy statement of the Republic of Sudan states: "Higher education is considered as an investment since human resources are vital for social economic development" (Sudan, Ministry of Education, 1984, p. 2).

Within Nigeria also, the tendency has been to view education as investment. The Ashby Report of 1960 proposed that the Nigerian government accept the concept of education as investment. The opportunity costs of investing in education were recognized by the report when it stated that:

> The Nigerian people will have to forego other things they want so that every available penny is invested in education . . . to the best of our belief nothing less than these proposals will suffice for Nigeria's development. (Nigeria, Federal Ministry of Education, 1960, p. 3)

Tanzania's First Five Year Plan of 1964-1969 reflected much of former President Nyerere's thinking on education as a form of social and private investment. In

his presidential address to parliament on May 12, 1965, Nyerere said:

> . . . expenditure on education in the coming years must be to equip Tanganyika with the skills and the knowledge which is needed if the development of the country and our people is to be achieved . . . (Nyerere, 1968, p. 31)

The persistent commitment to investment in education can also be seen, first, in the phenomenal increase in the provision of educational services (schools and institutes) and, second, in the huge expenditures (capital and recurrent) allocated toward education (Adesina and Tinuke, 1981). This social demand approach to education forced the LICs to plan for their manpower. But since unit costs are so high and resources so scarce in university education, most countries either ration places or link schooling expansion to manpower needs (Sheehan, 1973). On the other hand, the costs of education to the individual and to society differ as do the benefits. If this is the case, then the behaviour of private returns affect manpower targets and, therefore, private cost-benefit analysis is as important as is social cost-benefit analysis. Unfortunately, while most LICs' education policies emphasize the role of education in economic growth, they fail to address the issues related to labour market price signals and incentives in determining individual career choice and productivity. In other words, among individuals there exists a rational educational

calculus according to which these individuals choose more schooling or certain schooling channels, "as if they were equalizing the present values of alternative lifetime income streams, or otherwise expressed as if they were equalizing the rates of return to alternative investment options" (Blaug, 1964, p. 168).[3] Thus, school enrolment projections and other schooling expansion efforts which ignore private earnings patterns in labour markets, and thus neglect the price-elasticity of demand for degree courses, are almost certain to go wrong.

## Schooling, Productivity and Benefits

Does schooling or education in general contribute to increases in productivity and individual benefits? If so, how do the contributions to productivity and benefits vary across the different schooling levels and degree courses of specialization?

Given the limitations of this study, we are interested in economic growth and benefits. Available literature indicates that three major factors which contribute to increased productivity are: (a) investment in human capital; (b) investment in physical capital; and

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[3]In the Tanzania situation, this rational calculus is very important for mature students, who have to make a decision to leave their present secure jobs and enrol in a degree program whose future benefits they are not sure of. Yet parents have several investment alternatives.

(c) technological advances (Schug, 1985). The three factors contribute to economic growth through the process of savings and investment. Investment occurs when savings are used in the productive process. Schooling, education in general and training as forms of investment in human capital improve the knowledge and skills of workers. Research evidence shown below indicates that intangible investment in the quality of human capital has contributed to economic growth, individual productivity and other benefits.

Since Tanzania is a low-income socialist country, studies done in the Soviet Union may be relevant. Pioneering work has been carried out by Stanislav G. Strumilin as far back as early 1924. The major question of his studies was "what level of school qualification and what school expenditure per worker is most profitable" to the nation. One of his conclusions was that:

> The worker, by the product of his labour, creates not only the value of his earnings but also an additional product for society. The surplus product, which increases with the rise in labour productivity and the workers' qualifications, amounts before the Revolution to not less than 100% of his earnings. Hence, the significance of the school for the income side of the state budget should be roughly double. (In Machlup, 1975, p. 57)

Further, Strumilin gives a very telling conclusion after comparing expenditures for education with profits from education thus:

> . . . the profits accruing from the increase in labour productivity are 27.5 times greater than the corresponding outlay by the state on school education; this capital outlay from the exchequer is already repaid with interest during the first 1.5 years, while during the following 35.5 years, the state receives an annual net income from this "capital" without any expenditure whatsoever. A more profitable investment of "capital" could hardly be imagined, even in a country with such extraordinary possibilities as Soviet Russia. (In Machlup, 1975, p. 58)

The above work on the Soviet Union is very important for this study. First, the application of human capital concepts to the Soviet Union indicates that it is not true that concern with profit, productivity and rates of return on investment analysis are a bourgeois preoccupation. Second, it indicates that both "socialist exploitation" and "capitalist exploitation" are based on some economic principle, namely the production of "surplus product" by the worker that accrues to the state or the capitalist.

In the case of the United States, Schultz (1961) suggested that much of the economic growth which America had enjoyed in the first half of the twentieth century was due to increases in human capital. Schultz supports the apparent relationship between the national accumulation of skills and the increase in gross national product when he argues that:

> It has been widely observed that increases in national output have been large compared with the increase of land, man-hours, and physical reproducible capital. Investment in human capital is probably the major explanation for this difference. (Schultz, 1961, p. 13)

Therefore there has been increasing awareness that human capital, when combined with other factors of production, can be an important factor in economic development. The reason for this awareness is given by Weisbrod when he observes that:

> As technological developments have altered the production techniques, types of mechanical equipment and varieties of output, society has begun to recognize that economic progress involves not only expenditures on equipment but also in people. This investment in people makes it possible to take advantage of technical progress as well as to continue that progress. (Weisbrod, 1962, p. 106)

The above neoclassical or human capital approach has been supported by Denison (1962), Becker (1964), Blaug (1965), and recently by Psacharopoulos (1973; 1986). In general, these and other writers have:

a) related increased productivity on a national level to higher levels of schooling;
b) argued that higher levels of education increase salaries and rates of return to both society and individuals when compared to other social and private investments; and
c) shifted the emphasis on investment rates of return from machinery to people. (DeBevoise, 1983, p. 7)

Of course money invested in education does not necessarily lead to economic growth. In fact, for Tanzania, the link has yet to be proved. The question that arises then is: Should countries or individuals invest money or other resources in education? As far as Tanzania is concerned, it would seem that the answer is yes, because

options are kept open which would otherwise be closed. In fact, educated manpower is part of the infrastructure needed if economic development is to take place.

The foregoing review has concentrated on educational spending as a societal investment. At an individual level, educational spending yields positive rates of return. These returns have an impact on students' expectations about their employment opportunities and earnings. That is:

> . . . students do perceive the fields where demand is strong, differences in initial earnings high, higher rates of growth of earnings for higher degree levels, and also take differences in costs into account, so they are aware of different expected rates of return. Therefore they tend to gravitate to those fields and those degree levels where demand is high and where it is expected to grow. (McMahon and Wagner, 1981, p. 279)

Studies done in the United States indicate that there is more rapid employment in the high demand fields such as engineering, the sciences, agriculture and business administration (Psacharopoulos, 1982). In engineering, for example:

> . . . 95 percent of all graduates were not only employed by graduation, but they also received far more job offers than did those in other fields. Engineering graduates also received significantly higher salaries--averaging U.S.$27,864 in 1978 compared to U.S.$19,000 in business administration, and far less in music and education. (McMahon and Wagner, 1981, p. 183)

Given the fact that schooling yields economic returns to individuals, a number of studies have attempted

to quantify the sizes of these returns. Different approaches have been adopted depending on situations.

## Measurement of Returns

There are two main approaches to the measurement of returns of educational expenditures. The first is the macro-economic approach. This attempts to relate increases in aggregate production to increases in physical factors such as labour and machinery. The "residual" that is not accounted for by these factors is then attributed to improvement in the quality of human beings as productive agents.

Edward Denison, focusing his research on an explanation for the residual, looked at the factors contributing to the growth rate of the United States between 1929 and 1957 (Denison, 1962).[4] He argued that 23 percent of the growth in Real Gross National Income was due to increases in the length of formal education of the labour force; 20 percent was due to increases in the technological and managerial knowledge; while the increase in inputs of physical capital accounted for about 15 percent of the growth. The remaining eight percent (8%) was attributed to increasing returns to scale (Schultz, 1971, p. 136). Thus, except for the increases in the

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[4]The relative earnings of labour classified by level of schooling provided proxies for labour productivity.

labour force itself, education was the largest single source of growth in the United States for the period studied.

A similar study conducted by Betram in Canada for the period 1911 to 1961 indicated that the average income per man was about 30 percent higher in 1961 than it would have been if, other things being equal, there had been no improvement in the level of education. Improved education of the labour force had raised average labour productivity at the rate of 0.52 percent per year over the period (Betram, 1966).

The variant of the above macro approach used at the micro level draws on some elements of the Mincerian earnings-schooling function. More formally,

$$\ln Y = a + bS + cEx + dEx^2,$$

where Y = annual earnings, S = number of years of formal schooling, Ex = age - S - 6 = potential experience (the individual is assumed to commence school at age 6), and the estimated coefficient b is taken to be the private rate of return to one extra year of schooling. Recent studies which used this approach include those by Demetriades (1989) in the case of Cyprus and Psacharopoulos (1985) in the case of Greece. The results of these studies indicate that only two measures of human capital, years of schooling and experience, alone explain about one third of the variations in earnings ($R^2 = 0.337$).

The second method of measuring the returns to educational investment distinguishes between private and social rates of return. The individual tends to be concerned with the former, whereas governments are concerned with the latter. This method uses cross-sectional age-earnings data or time series earnings data to calculate the returns.

The private rate of return to education is the financial return in the form of increased monetary earnings which the individual gains as a result of more investment in education. The costs, both direct and indirect, to the individual and/or his/her family constitute the investment. The return on investment is made up of the subsequent increase in earnings as a result of the additional educational expenditure minus the investment costs as given by either cross-sectional or time series data.

Becker (1964) examined the rates of return on education in the United States[5] and found that:

> . . . investment in education in fact steepens and increases concavity of age earnings profiles and that there are positive returns to education. (Becker, 1964, p. 156)

Studies by Wilkinson (1966), Podoluk (1965), Dupuis (1968) and Psacharopoulos (1975) show that the private rates of return to education have been positive, although

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[5]Unlike Denison whose concern was accounting for growth in the economy, Becker narrowed the observed earnings differentials for estimating a rate of return to investment in education, net of ability and other factors.

there have been significant differences in the rates of return at different levels of education in different countries. For example, Kenya had a 30 percent private rate of return to secondary education and a 27.7 percent private rate to college education. Japan, on the other hand, had a six percent private rate of return for secondary education and a nine percent rate for higher education (Psacharopoulos, 1973b).

Table 2.1 gives an international comparison of social and private returns to educational levels as summarized by Psacharopoulos (1973). The data would tend to suggest that:

> . . . the private returns are consistently higher than the social returns . . .: the highest returns are to primary level graduates; returns to secondary and higher education are usually quite close but lower than to primary . . .: the social rates of return for secondary and higher education are for most countries surprisingly close to the social rates for investment in other sectors. (Simmons, 1980, p. 56)

Some of the above-mentioned studies on private and social returns involved time series projections of earnings from cross-sectional data. These projections were justified by the extraordinarily long pay-off period from investment in schooling. Since there is always some diffusion of more and more education in successive age-cohorts, earning differentials at any age level decrease over time. Therefore, present cross-sectional statistics tend to over-estimate returns. However, Blaug (1965) has

Table 2.1

Social and Private Rates of Return by Educational Level and Country (percentages)

| Country | Year | Social | | | Private | | |
|---|---|---|---|---|---|---|---|
| | | Primary | Secondary | High | Primary | Secondary | High |
| U.S.A. | 1959 | 17.8 | 14.0 | 9.7 | 155.1 | 19.5 | 13.6 |
| Canada | 1961 | -- | 11.7 | 14.0 | -- | 16.3 | 19.7 |
| Mexico | 1963 | 25.0 | 17.0 | 23.0 | 32.0 | 23.0 | 29.0 |
| Colombia | 1966 | 40.0 | 24.0 | 8.0 | 50.0 | 32.0 | 15.5 |
| India | 1960 | 20.2 | 16.8 | 12.7 | 24.8 | 19.2 | 14.3 |
| Nigeria | 1966 | 23.0 | 12.8 | 17.0 | 30.0 | 14.0 | 34.0 |
| Ghana | 1967 | 18.0 | 13.0 | 16.5 | 24.5 | 17.0 | 37.0 |
| Kenya | 1968 | 21.7 | 19.2 | 8.8 | 32.7 | 30.0 | 27.4 |
| Uganda | 1965 | 66.0 | 28.6 | 12.0 | -- | -- | -- |
| Philippines | 1966 | 7.0 | 21.0 | 11.0 | 7.5 | 28.0 | 12.5 |

Source: Psacharopolous, G., in *Returns to Education* (1973).

provided some advantages of cross-sectional data over genuine life-cycle data, namely:

> . . . they are free from the influence of the trade cycle and implicitly provide estimates in money of constant purchasing power . . . they reflect the way in which private choices are actually made: an average person forms his expectations of the financial benefits of additional years of schooling by comparing the present earnings of different occupations . . . by cross-section comparison. (p. 224)

Studies which have used time series pay scale data in the LICs have been justified on several grounds. First, the calculations of returns using pay scale data could be taken as ex-post investment exercises to determine the performance of past investment decisions. Second, in most LICs, the rate of inflation has always been very high. Therefore, future earnings estimated from cross-sectional data would give over-estimated nominal private returns. For investment decisions, real private rates would be required.

## Research on Returns

Below an attempt will be made to review some rates of return studies which have been conducted in selected developing countries. The state of the rates of return knowledge by fields of study and gender will be reviewed.

Examples of Internal Rate of Return Studies

A number of rate of return studies in developing countries have had a consciously practical aim. The studies described below appear to be relevant to the Tanzania situation.

The study on Kenya by Thias and Carnoy (1962) is a benefit-cost analysis of education in that country. This study, a survey of 5,000 employees in three urban areas, provided the following information:

1. Rates of return (private and social) to investment in education after adjusting for differences in socio-economic background and some other factors;
2. The projected output of the educational system, and estimates of the various future alternative wages and employment; and
3. Rates of return to increases in different kinds of expenditures per pupil.

The major findings of this study included the facts that the amount of individual earnings accounted for by education was near 0.8 and that social benefits were higher for primary education than for the other levels.

Bowles (1967) used linear programming techniques in the case of Northern Nigeria to solve the problem of resource allocation within education over an eight-year period. His objective function was the maximization of the difference between economic benefits and costs of

education. He also made adjustments for wastage, failures, labour force participation and unemployment. His findings include the following:

1. The claim of the educational sector on economic resources is very strong;
2. In order to obtain an efficient allocation of resources within the sector, it is necessary to have a rapid expansion of primary education and a reduction in enrolment of technical and secondary schools; and
3. Major increases in the efficiency of the system can be obtained by introducing new technologies.

Hinchliffe (1969) estimated rates of return for the western region of Nigeria by using government pay scales for secondary modern, secondary grammar, sixth form and university graduates. Weighted earnings in agriculture, transport and construction activities were used for primary school graduates. The findings indicated that unadjusted social rates of return were 23 percent for primary education, 12.8 percent for secondary grammar education and 17 percent for university.

The study by Smith and Benett (1967) in Uganda used longitudinal earnings data to show that the individual and society benefits from increased schooling are large. However, this study also indicates that the primary education level yields higher rates of return than the secondary level or the higher education level.

Heyneman's (1980) data on Malawi emanate from a secondary school tracer study and not the usual cross-sectional survey of the households or school graduates. His calculations were based on the assumption that the level of unemployment would remain constant over a working lifetime. In this case, the social and private rates of return for secondary education were 0.21 and 0.50 respectively.

In their "Training and Productivity in Eastern Africa" study, Maliyamkono, Ishumi and Wells (1982) found that the social rates of return for university level programs ranged from 10 percent to 22 percent and that there were higher rates of return in the case of locally trained university graduates than in the case of the overseas trained, with the exception of secondary school teachers and managers. This study shows how intercountry policy differences affect the returns to education. In fact, one of the recommendations of this study states that:

> To ensure productivity and job performance, and to forestall wilful underemployment as well as demoralization and unnecessary labour mobility, the countries in East Africa should adopt a policy of positive remuneration and incentive system. (p. 274)

Another study by Loxley and Psacharopoulos (1985) uses regression adjusted earnings to show that in the diversified secondary school programs of Tanzania, the academic secondary school bias exhibits the highest rate of return (6.3%) and the technical bias the lowest (1.7%).

However, the authors caution against using an economic analysis criterion uncritically in countries where specific education programs serve national and political objectives. On Tanzania's secondary diversified program, they argue that:

> . . . its value should be judged to the extent to which it advances realization of national objectives of socialism and self-reliance and the extent to which individuals themselves profit from their educational experiences. (Psacharopolous and Loxley, 1985, p. 207)

The above studies are not without their limitations. However, they indicate the following. First, with adjustments rate of return analysis can be used to evaluate education programs in develcping countries. Second, both cross-sectional and longitudinal earnings data have been used depending on circumstances and data availability in a particular country. Third education programs serve specific national objectives and therefore economic analysis findings should be interpreted with those objectives in mind.

Rates of Return by Field of Study

The economic theory of career choice suggests that changes such as occupational preferences, private demand for specific degree courses and enrolment rates by fields of study result from responses to changing market opportunities, particularly to changing relative discounted

lifetime incomes in relevant alternative fields. Thus the individual choosing a career is presumed to:

> . . . (1) calculate expected lifetime income on the basis of market wages and his abilities; (2) adjust the value of this income and his initial wealth to reflect the non monetary pleasures or displeasures of working in an alternative job; (3) select the career with the highest total utility (overall attractiveness). (Freeman, in Gordon, 1974, p. 95)

Evidence on the degree to which students are sensitive to and respond to the above economic factors by field of study was given by Freeman (1971). In his study, the role of various subjects and subject combinations in preparing students varied by field and type of degree. Baccalaureate studies in engineering and accounting are confined almost entirely to persons planning careers in those fields. By contrast, most social science majors obtained jobs in occupations only remotely related to social science disciplines but with higher returns. The intention of graduates to seek employment in a field appeared to be influenced by the state of the labour market, especially at the Bachelor's level.

Expected rates of return can be accurate estimates of the actual rates of return for degree fields. Table 2.2 gives the actual rates of return as given by United States census data and the expected rates of return by occupation in the U.S. and in Egypt. There is a relationship between expected rates of return and the actual rates. The highest rates of return fields are medicine, architecture and

Table 2.2

Expected and Realized Rates of Return by Field of Study in Egypt (1978) and U.S.A. (1982)

| Occupational Field of Study | Expected Rate of Return (%) | | Realized Social Rate of Return |
|---|---|---|---|
| | Egypt | U.S.A. | U.S.A. |
| Medicine | 17.2 | 12.7 | 7.2 |
| Physical Sciences | 14.9 | 9.4 | 8.7 |
| Architecture | 20.3 | 17.2 | 8.5 |
| Agronomy | 15.3 | -- | -- |
| Commerce | 13.3 | 15.9 | 11.3 |
| Veterinary Medicine | 13.0 | -- | -- |
| Fine Arts | 12.2 | -- | -- |
| Social Sciences | 11.8 | -4.1 | 8.0 |
| Economics and Politics | 11.0 | 15.5 | 14.1 |

Sources:

(1) Psacharopoulos and Sanyal (1981a), for Egypt.

(2) McMahon and Geske (1982), for U.S.A.

commerce. Yet another study showed that the lowest expected rates of return are in elementary education and the ministry, falling in the low -17 to +3.3 percent range (McMahon and Wagner, 1981). Evidence as shown by Eckhaus, El-Safty and Norman (1974) indicates that similar patterns of differences in rates of return have tended to persist over relatively long periods of time. Freeman (1971) and Feber and McMahon (1979) have argued that this persistence of different rates of return is most likely to be due in part to the following: (a) the limitations on entry imposed by some fields (e.g., medicine); (b) the relative ease of entry into other fields (e.g., primary and secondary education); and (c) the larger expected psychic and social benefits in some fields (e.g., music, ministry).

Studies done in the LICs do not support the traditionally-held belief that introducing a vocational element into the curriculum is conducive to high returns. Returns to investment in traditional academic (general) curricula are greater on the average than the returns to investment in specialized fields (Psacharopolous, 1985). This is due to the higher unit cost of producing technical graduates and to the fact that graduates from both streams are absorbed equally well by the labour market (Psacharopolous, 1985). In fact, at the university level, the high-cost specialties such as agriculture and the general sciences exhibit low returns, whereas economics,

medicine, law, engineering and the social sciences exhibit high returns, as shown in Table 2.3.

Average Returns to Schooling by Gender

For a variety of reasons, "women in most countries earn on an average substantially less than men" (Psacharopoulos, 1985, p. 588). But the rate of return is a relative concept and, therefore, sometimes the profitability of investment in women's education is greater than that of men. This appears to be the finding of Tilak's (1987) study, namely that:

> . . . contrary to general belief, the crude rates of return for women were found to be greater than the returns for men to most levels of education. Since the costs of women's education, private as well as social, are relatively lower, despite lower average earnings, the returns for women are higher compared to men. (p. 166)

Tilak's findings supported Psacharopoulos' data shown in Table 2.4. These data indicate that the average rate of return for women in the low income countries exceed that for men by four percentage points.

However, the question as to whether investment in schooling is more profitable for men than women is more complicated than the difference in average earnings might suggest (Woodhall, 1973, p. 278). While wage (earnings) discrimination may be said to occur when differences in wages or earnings are not based on productivity differences, the differences in rates of return cannot be

Table 2.3

Average Returns for Selected University Programs

| Program | Rate of Return (Percent) |
|---|---|
| Economics | 13 |
| Law | 12 |
| Social Sciences | 11 |
| Medicine | 12 |
| Engineering | 12 |
| Sciences, Math, Physics | 8 |
| Agriculture | 8 |

Source: Psacharopoulos, 1985, p. 590.

Table 2.4

Average Returns to Education by Gender

| Country Group | Educational Level | Men (%) | Women (%) |
|---|---|---|---|
| All countries | Primary | 19 | 17 |
| | Secondary | 16 | 21 |
| | Higher | 15 | 14 |
| Developing Countries | Overall | 11 | 15 |

Source: Psacharopoulos, 1985, p. 589.

attributed to earnings differentials unless the costs of schooling by gender are also compared (Tilak, 1987, p. 147). Unanswered questions remain, as follows: How do the sizes of the average earnings compare by gender? How do the sizes of the private costs compare by gender? How do the private costs and average earnings combine to determine gender differences in private rates of return?

## Contradictory Perspectives and Critiques

So far we have presented the human capital perspective as if it has not been challenged. The section which follows highlights the major contradictory approaches and critiques to economic investment analysis of education. The contradictory approaches and critiques are related to the value of education, imperfections in the labour market as determinants of earnings and the role of schooling in capitalist societies.

### Economic Value of Education

The economic explanation of the value of education is that education imparts vocationally useful skills which are in scarce supply.[6] But this does not mean that there

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[6]This explanation leads to economic cost benefit analysis of the value of education. Certainly it does not mean that other forms of valuation cannot be made. In this case, sociologists and psychologists are at liberty to develop socio-cost benefit and psycho-cost benefit tools.

are no other explanations for the value of education. Blaug (1973) showed that the sociological explanation argues that education disseminates definite social values, in effect recruiting children into the ruling elite of a society. On the other hand, the psychological explanation argues that education acts as a screening device to select the most able people for the best jobs.

Three points should be raised regarding the economic value of education arguments. First, the phrase "educated workers are more productive" is a sloppy shorthand for "education makes the marginal worker of a given age, sex, socio-economic status, work experience and native ability more productive when he is furnished with the same quantity and quality of management, capital equipment and complement of all workers as before." Second, the term "productivity" in economics is related to the term "scarcity." Someone is highly productive in the economic sense if he possesses an ability or a qualification which is extremely scarce. Third, as pointed out by Blaug (1973), education to economists is simply a "black box." They do not profess to know what happens to anyone passing through it; all they know is that employers value the experience and are willing to pay for it. The price being determined by the supply and demand conditions of that valued experience.

Yet there are some researchers who argue that: (a) people are not machines and are too unreliable to be treated as capital, therefore such investment is not truly rational; and (b) it is particularly difficult to estimate what the returns from education actually are and how they can be distinguished from other elements (Hopkin, 1987).

The above views find support in Schaffer when he argues that:

> . . . where it is possible to separate consumption expenditures from investment in man it would still remain a virtual impossibility to allocate a specific return to investment in man . . . . The return on the investment cannot be computed satisfactorily as both the amount of pure "investment" and the return to be allocated thereto are conjectural. (Schaffer, 1961, p. 46)

On the other hand, Bowles and Gintis (1976) argue that, although schools prepare students for work, this may not be through the cognitive domain. They argue that the skills valued most by the employers are punctuality, initiative, obedience, respect for authority, self-reliance and the ability to make decisions. These skills are essentially non-cognitive. In any case, the social structure and evaluation practice in schools encourage the development of traits outside the cognitive domain which are necessary for adequate job performance. Simmons, writing on this issue with respect to the LDCs, indicates that:

> . . . both these social and private rates tend to over-estimate the economic returns because they are not adjusted for the cognitive abilities and

> effective traits that students gain before entering school, or for skills gained after leaving school, such as work experience. (Simmons, 1980, p. 55)

Levin and Rumberger (1981) observe that, while technology is deskilling jobs, there is an over-production of college graduates. Thus, there is over-education of people in relation to the available work. They argue further that higher levels of education are counter-productive because of workers' dissatisfaction with occupying jobs that do not utilize their skills. In essence, then, as long as graduates are under-utilized, there is no way that education can contribute to substantial economic returns.

## Imperfect Labour Markets and Segmentation Theory

In order for the rate of return analysis to be used as a criterion for investment decisions and indicator of allocation of educated labour, three assumptions are made:

> . . . (1) educational attainment influences earnings; (2) earnings reflect marginal productivity of labour; (3) labour markets must be sufficiently flexible so that identical workers are paid the same wage. (Carr-Hill and Magnussen, 1973, p. 55)

The major argument of labour market segmentation theory is that earnings differentials do not adequately measure differences in the productivity of workers because of imperfections in the labour market. Accordingly, labour

market conditions can be understood as products of four segmentation processes: (a) segmentation into primary and secondary markets; (b) segmentation within the primary sector; (c) segmentation by race; and (d) segmentation by gender. The primary and secondary segments are differentiated as follows:

> Primary jobs require and develop stable working habits; skills are often acquired on the job; wages are relatively high; and a job ladder exists. Secondary jobs do not require and often discourage stable working habits; wages are low; turnover is high; and job ladders are few. Secondary jobs are mainly filled by minority workers, women and youth. (Reich et al. in Carnoy, 1975, p. 1)

The implication of the above labour segmentation theory is to question the assumption that education and training lead to higher income distribution through increasing per capita productivity which leads, in turn, to higher earnings.

But are earnings a fair proxy for productivity? The counter argument is usually based on the assumption that, for economies where a large portion of the salaried labour force is employed in the public sector, differences in earnings have accrued because of an inherited wage structure, and do not represent a difference in marginal value. However, this argument does not explain why education appears to be a good predictor of advancement in earnings after employment has been obtained (Psacharopoulos, 1980b). In any case, recent counter

evidence on the productivity of public service workers which includes data from centrally planned economies is given by Philips-Brown (1977). What is true is the fact that there are less than purely competitive wage markets in most countries. But it is worth asking:

> . . . whether there is any milieu in which an economic return is based upon a pure competitive market. . . . There are serious distortions in price indicators: farmers are subsidized (or penalized); infant industries may be protected . . . . All estimates of economic returns are subject to distortions of significant proportions and this is no less and no more true of education. (Heyneman, 1980, p. 27)

In any case, how do we decide whether real world conditions approximate the model of perfect competition and, particularly, the model of competitive labour markets? -- not by examining the assumptions of the model which at best can be only more or less plausible, but by checking its predictions against observed facts (Tilak, 1987). The principal prediction of a competitive model of the labour market is that excess demand (shortages) will raise relative earnings and that excess supply (unemployment) will lower them. The model predicts further that labour of the same type will fetch the same price in any local market but not if that labour is employed in different occupations and under different working conditions. The skills that are costly to acquire will tend to command higher earnings. A subsidy to producers will encourage employment while a

payroll tax will tend to discourage employment (Blaug, 1973).

The labour segmentation theory has also been challenged on methodological grounds. Cain (1976), for example, argued that empirical tests of such descriptive rather than theoretical propositions have suffered from a statistical artifact. By fitting earnings functions within low-paying bad jobs and high-paying good jobs separately, one necessarily truncates the income dependent of the latter group and finds a lower effect of education on earnings. Yet the most telling argument against segmentation was given by Corb and Stelcer (1983) when they argued that the labour market is a continuum, with no clear-cut line separating the alleged segments. The acquisition of a higher level of schooling has allowed many workers to cross over to the higher "segment," something they could not have achieved without an extra dose of education. Evidence on mobility across segments requires the use of longitudinal data, not cross-sectional data.

Marxian-Conflict Perspectives

According to the Marxist-conflict perspective, lifelong education reflects the dualistic structure of the social system, which produces the distinction between intellectual versus manual work, and elitist versus mass education. At the same time, schooling reproduces the

social system through three interdependent factors which counteract. These are: (a) the recurrence of the elitist education system and its values; (b) the social relations which are based on exploitation within the capitalist system; and (c) the commercial value which has been attached to lifelong education.

Education from the Marxist view is a means by which the dominant social class perpetuates the status quo from generation to generation (Bowles, 1972). By providing schooling to their offspring, the dominant class ensures that the income earning power and economic dominance of this class will be sustained. Schools enhance docility characteristics in the students which are rewarded by employers, rather than imparting productivity-augmenting skills (Bowles and Gintis, 1975).

Levin (1980), Bowles (1980) and Carnoy (1974) argued further that differential rates of return to education are not the result of inequality in the distribution of schooling, but refer instead to the basic inequality in the structures of commodity production societies. Carnoy (1979) is more critical and, in fact, explains that variables exogenous to individual productivity determine the wage structure. These variables are gender, race, the nature of firms, social class background, monopoly power in the market, and meritocratic rules.

The Marxian critiques appear to be specifically aimed at the capitalist countries. They are derived from a conflict analysis of capitalist societies. The analysis concentrates on the way different people in society relate to the production relations and the generated social relations, and the way in which these relations affect income distribution and earnings. There are some limitations to this analysis. First, the analysis as presented does not necessarily deny the productive value of education; it is more an issue of <u>how</u> education was acquired in the first place and by <u>whom</u>. Social mobility research has widely demonstrated that education helps children of many social origins to reach the highest occupational classes and income groups (Anderson, 1986). Second, by implication the conflict scholars argue that, unless one changes society fundamentally, cost-benefit analysis cannot be applied to education. It is not necessary to change society so as to use a tool of analysis. In fact, this is the main reason why one works with certain assumptions. In any case, if conflict analysis as presented above is accepted, then cost-benefit analysis is the right tool to use in doing an analysis for socialist countries such as Tanzania where capitalist tendencies have been arrested.

Adjustments

Despite the above reviewed objections to internal rate of return analysis, Woodhall (1970) has shown that the whole concept of cost-benefit analysis is still valid and goes on to suggest ways in which the analysis can be modified in order to take into account specific problems and issues. With the discovery of adjustment techniques and multivariate analysis tools, it is possible to isolate the contribution of schooling to earnings from that of other factors such as experience, ability, gender and family background (Morgan et al., 1962). In this case, then:

> . . . the question is not "Does education have an effect on earnings," but "How much of the observed earnings differentials of educated workers is actually the result of their education?" (Woodhall, 1970, p. 28)

The internal rate of return calculations represent something close to maximum likelihood estimates of the average yields of additional expenditures on schooling. As pointed out by Blaug:

> . . . they are merely a summary statistic expressing the prevailing relationship between the costs of more schooling and the earnings that may be more or less confidentially expected to result from it. (Blaug, 1967a, p. 266)

The several adjustments described in the methodology section of the study take care of much of the criticism regarding the inaccuracies in the estimation procedure.

## Utility of Studies and Research Gaps

The above review suggests that internal rate of return analysis for education has some practical usefulness. It relates to the problems of resource allocation between levels of education, fields of study and benefit distribution by gender. Where the benefits of schooling are unequally distributed, rate of return findings may suggest a reversal of policies and priorities.

The reviewed studies indicated that the realized private benefits do not differ substantially from the expected private benefits by fields of study or occupations. This observation reinforces the argument that private returns determine career path choices among students. This finding also points to the importance of government's policy of user fees, grants, bursaries and scholarships in controlling and influencing demand for certain types of education or degree programs.

However, the surveyed literature portrays the following research gaps. First, most studies are based on cross-section surveys. These surveys do not show how the rates of return change over time. As observed by Schiefelbein:

> The finding that in developed countries rates of return are lower than in developing countries should be examined from a longitudinal perspective to verify whether the rates really decline with higher levels of development. (Schiefelbein, 1983, p. 52)

Second, the studies are based on aggregated data, namely: private returns for primary, secondary and higher education. If the findings are to be meaningful to the individuals making career choices, the data ought to be disaggregated so as to show the costs, benefits and returns by subjects, courses, or occupations. Third, the empirical and technical findings of cost-benefit analysis are not usually discussed in the context of global educational policies and objectives of the particular countries. In fact, cost-benefit analysis findings are supposed to influence education resource allocation decisions, supplement the information given by manpower forecasts, and help narrow the gap between national manpower planning objectives and individual career choices.

## Conclusion

This review has provided evidence that education and schooling in general can be regarded as a form of investment in the context of human capital theory. The internal rate of return approach has been used widely as an economic tool to evaluate the monetary contribution of schooling. Despite the reviewed objections to the internal rate of return approach as a tool of evaluating economic goals of education, it has won many converts. The approach can still be used in LICs with adjustments and modifications.

# CHAPTER III

# INSTRUMENTATION AND DATA COLLECTION

## Instruments

The data for this study were collected from two sources. One source was the University of Dar-es-Salaam graduates working in the city of Dar-es-Salaam and the towns of Arusha, Mwanza and Mbeya. These four urban areas have the highest concentration of industrial development. Data were also collected from the Ministries of Education and of Manpower Development, as well as the Standing Committee on Parastatal Organizations (S.C.O.P.O.). The S.C.O.P.O. is responsible for adjusting pay scales in public institutions to reflect changes in the cost of living.

A questionnaire and an interview schedule (see Appendix A) were used for the collection of the data coming from University graduates. Data sheets were used in tracing the gross pay annual salaries for the period 1973-1987.

The Questionnaire

A first draft of the questionnaire was completed by 20 University of Dar-es-Salaam graduates working in Dar-es-Salaam. Their responses were used in drafting the final form. Table 3.1 gives the major variables studied.

The following suggestions were incorporated in the final questionnaire:

1. That item No. 7 should not have the alternative "Not Employed." Instead it was suggested that the respondents who were not employed before joining university (direct entrants) should leave an empty space. This procedure allowed the researcher to fill in the foregone earnings as given in public pay-scales.
2. That since most university costs are paid for by the government, question No. 8 should ask the respondents to give an estimate of the extra private expenditures which they incurred in each year of their university schooling. Most respondents argued that they could remember the total private direct costs but not the breakdown of these costs.

The questionnaire was then composed of three parts. Part one dealt with background information on the respondents, namely: present age, gender, age at start of degree course, type of employer, name of degree course studied, nature of entry into the university and whether a respondent was employed before entry into university or

Table 3.1

Definition of Variables

| Original | Derived Value Labels |
|---|---|
| **BASIC** | |
| Age (years) | $V_1$ = actual |
| Sex | $V_2$ = 1 if male, 0 if female |
| Age at start of degree | $V_3$ = actual |
| Degree Course | $V_4$ = 1 B.A.Ed., 2 B.A.Gen., 3 B.Sc.Ed., 4 B.Sc.Gen., 5 LL.B., 6 B.Sc.Eng., 7 B.Sc.Agr., 8 M.D. |
| Nature of entry into degree course | $V_5$ = 1 if Direct, 2 if Indirect |
| Employment before degree course | $V_6$ = 1 if Yes, 2 if No |
| Experience | exp = actual |
| **PRIVATE COSTS** | |
| Opportunity Costs | $V_7$ = actual foregone earnings |
| Direct Private Costs | $V_8$ = actual year 1<br>$V_9$ = actual year 2<br>$V_{10}$ = actual year 3<br>$V_{11}$ = actual year 4<br>$V_{12}$ = actual year 5 |
| **PRIVATE BENEFITS** | |
| Net Salary Earnings | $V_{13}$ = actual, year 1986<br>$V_{14}$ = actual, year 1985<br>$V_{15}$ = actual, year 1984 |

not. Part two asked questions on costs: opportunity costs, given as foregone earnings for mature students or filled in by the researcher as earnings of form six graduates in the case of direct students; and extra private direct expenditures and annual allowances given to students by the government. Part three asked questions on benefits represented by gross and net annual earnings.

The Interview Schedule

The final interview schedule consisted of five open-ended questions. These questions dealt with the following: comparison of the private costs and the private benefits; comparison of private returns across the degree courses; education funding policies and their relationship to private benefits; and a comparison of private benefits across gender and nature of university entry variables. The major purpose of the interview schedule was to supplement responses from questionnaires and secondary sources. It was felt that individual valuation of schooling benefits was as important in determining private decisions as was orthodox economic analysis.

The Pay Scale Data Sheets

The employers' public pay scale data sheets consisted of two parts. The first part required information on the type of employer, while the second part

required the employers/researcher to trace the 1974-1987 annual earnings of university graduates who were first employed in 1974-75 for the different degree courses. These data sheets were also used in tracing the over-time minimum wages and the form six direct employed graduates' earnings (see Appendix B).

## Sample and Sampling Techniques

### The Sample

The subjects of the study were taken from the capital city of Dar-es-Salaam and the towns of Arusha, Mwanza and Mbeya. Only University of Dar-es-Salaam graduates without any post-graduate training were considered. Since, in the year 1987, the government had announced new salary pay scales, all graduates who were not employed by 1986 were not considered because these would have raised the earnings substantially.

A random sample was not used and, therefore, as pointed out in the limitations section, generalizations could not be made. The two reasons for not using a random sample were: first, there was no register of university graduates by employer. Second, a random sample would not have captured the representative graduates of the various degree programs by gender, nature of entry and employer. Therefore, the strategy was to identify the major employing

institutions in each town and then administer the questionnaires and interviews to university graduates in those institutions.

The above procedure produced a sample of 300 respondents who answered the questionnaires out of a total of 450 questionnaires which were distributed. The total number of interviews conducted were 20. The interviewees were selected to represent degree programs, gender, nature of entry into university and employer.

Of the 300 respondents, 209 (69.9%) were males while 90 (30.1%) were females. The number of direct and mature students who responded was 184 (61.5%) and 115 (38.5%), respectively. The distribution of respondents by degree programs was as follows: B.A. (Education) 46 (15.6%); B.A. (General) 70 (23.7%); B.Sc. (General) 20 (6.8%); B.Sc. (Education) 46 (15.6%); LL.B. 40 (13.6%); B.Sc. (Engineering) 19 (6.4%); B.Sc. (Agriculture) 19 (4.4%) and Doctor of Medicine 13 (4.4%). Five respondents did not indicate their degree program.

## Data Collection

Data collection went through the following three stages: (a) preparation; (b) administration; and (c) data coding and transcription.

During the preparation stage the following research clearances were obtained (see Appendix C):

1. The University of Dar-es-Salaam staff and students research clearance. Reference No. AB3/3(B). signed by the Vice-Chancellor. This type of clearance grants general permission to carry out research in Tanzania. Usually, the University of Dar-es-Salaam Administration is empowered by the government to give research clearance at its discretion to its staff and students.
2. The City or Town Council research clearance. Reference No. 19/27. This type of clearance was granted to allow the researcher to visit any institution within the city or town council area.
3. A letter from the Ministry of Education addressed to principals and headmasters/headmistresses of schools showing the Ministry's support to conduct the study in the selected schools and colleges.

The second stage was instrument administration. Two research assistants were trained on how to identify the respondents in the institutions and distribute the questionnaires on behalf of the researcher. The major involvement of the research assistants was to trace the graduates of different degree programs distribute the questionnaires, and later collect the questionnaires at an agreed-upon date. The use of research assistants gave rise to some problems. First some respondents were already senior officers in their place of work. They did not like answering questionnaires administered by young research

assistants. Second, on some occasions, the research assistants could not give clarification on certain questionnaire items or explain why the study was important. At the time of conducting the study, another study was being carried out by the government to determine wage differentials in urban areas. Some respondents felt that this study was related to those studies usually conducted by politicians and whose impact they never see.

The fact that all the respondents were university degree graduates would tend to suggest that it was easy to get their responses. This was not the case. A good number of university graduates work in the Prime Minister's office which is responsible for regional planning and development. Yet the response rate was lowest among the university graduates in this office. One of the respondents gave the reason as:

> As workers in the Prime Minister's office, we are not allowed to give out background information related to our education, salary, general life etc. I am sorry that I cannot fill in your questionnaire. (Prime Minister's office respondent)

Such answers from respondents are normal in LICs.

## Reliability and Validity Issues

Some authors associate reliability and validity with tests rather than with questionnaires. This association was implied by Engelhart when he argued that:

> The characteristics of a test most fundamental to its effectiveness and which is contributed to by all other desirable characteristics is its validity . . . . how well it measures what it is designed to measure . . . . Similarly, reliability most simply refers to the consistency with which the scores on a test are related to the scores on the same test given a second time. (Engelhart, 1971, p. 151)

However, Borg and Gall (1983, p. 281) extended their definition to other measuring instruments. They observed that reliability relates to the level of internal consistency or stability of the measuring device over time. Accuracy and precision of measuring research instruments are of particular importance to studies which rely on data collection through single observations or one shot case studies and interviews. On the other hand, reliability and validity are closely linked. A valid research instrument is necessarily reliable. If a researcher knew that a given observation were perfectly valid, reliability would not be an issue (Kerlinger, 1973, p. 455). In fact, Engelhart went as far as arguing that:

> . . . while high reliability should be sought, a relatively unreliable test may have adequate reliability for group comparisons. Unreliability is a limitation, but it is a limitation that can be taken into account when interpreting the data. (Engelhart, 1971, p. 89)

The validity of the questionnaire and interview schedule was established through expert opinion and literature surveys of variables related to cost-benefit analysis. The first drafts of the questionnaire and interview schedule were discussed with four post-graduate colleagues who had specialized in educational finance so as to identify the missing variables. Variables which were not relevant to the Tanzania situation were taken out of the instruments.

Threats to instrument reliability were minimized by careful recording of costs, earnings and other adjustments data. There was continual scrutiny of data and cross-checking of secondary sources such as government documents and reports, employers' reports and pay scales. There was no intent to generalize the study findings, therefore external validity was not addressed.

Two other issues related to stability and reliability had to be resolved. These were question bias and investigator or respondent bias. Investigator or respondent bias refers to the potential effects that the two actors may have on the research study. Gergen (1968b, p. 212) argued that investigator bias may be of particular significance in face-to-face interviews if the respondent and the researcher bargain in order to receive a certain outcome. On the other hand, question bias may be introduced in the study if a particular question elicits

responses determined by characteristics of the question itself rather than the "state of nature" (Gergen, 1968b, p. 215).

Two steps were taken in order to reduce investigator and question bias. First, the researcher himself reduced his emotional investment in the outcome of the study. The researcher(s) visited the respondents two days before conducting interviews to create a friendly, informal atmosphere. During this time, the objectives of the study were explained so as to create a positive attitude toward it by the respondents. Second, only questions relevant to the study were formulated. The interview questions were open-ended. The use of open-ended questions helped to minimize question bias.

## Summary

This chapter has described the three instruments used in this study: the questionnaire, the interview schedule and the pay scale data sheets. The sample and sampling techniques were described. Given that the sample was not random, it was shown that the findings could not be generalized. The chapter also highlighted the major difficulties encountered during instrument administration and data collection. Lastly, some issues related to reliability and validity were discussed.

# CHAPTER IV

# THE PRIVATE RATE OF RETURN: METHODOLOGY AND ANALYSIS

## Introduction

This study essentially analysed the following indicators of performance of university education in Tanzania: (a) rankings of earnings and private costs by degree programs, gender and nature of entry into university degree programs; (b) differential age-earnings variances by degree programs; and (c) the private rates of return and the related private cost-benefit values for different degree programs.

The three commonly used investment decision criteria are the Net Present Value (NPV), the Benefit-Cost Ratio (BCR) and the Internal Rate of Return (IRR) (Eckstein, 1961; Dasgupta and Pearce, 1972; Sassone and Schaffer, 1978; Ramsey, 1970). Each criterion has its own relative advantages and weaknesses, although the internal rate of return has been extensively used in the field of economics of education (Tilak, 1987). For example, out of the 53 studies which Psacharopoulos (1973) reviewed, 28 were in terms of rate of return, 15 used both Net Present

Value and Rate of Return, while five were exclusively in terms of Net Present Values.

The internal rate of return may not be unique. Multiple rates of return occur specifically when the net benefit stream moves in "a zig-zag way with positive and negative values, which happens in sectors like railways" (Tilak, 1987). However, Jean (1969) showed that only in such special circumstances does the internal rate of return take multiple values. In any case, in the field of economics of education where salary earnings rise over time relative to initial schooling costs, multiple rates of return are a rare phenomenon.

In estimating the above investment decision criteria, three types of data were used. The pay scale salaries data extracted from official documents for the period 1974-1986 were used in estimating the ex-post investment criteria: ex-post net present values, ex-post cost benefit ratios and ex-post private internal rates of return for each degree program. The age-earnings-costs data extracted from a cross-sectional sample of 300 university graduates were used in estimating the ex-ante investment criteria: the ex-ante net present values, ex-ante cost benefit ratios and ex-ante private internal rates of return to each degree program. The interview data from university graduates supplemented the above "ex-post longitudinal" and cross-sectional data by revealing the

individual university graduate's evaluation of the private benefits and costs associated with their schooling.

Private Costs by Degree Programs, Gender and Type of Entry into University

The private costs of university degree programs consisted of two parts: private direct costs and private indirect costs. An elaborate taxonomy of costs of education has been given by Tilak (1985a) and, based on this taxonomy, the Tanzanian private costs were shown to consist of mainly the foregone earnings and non-tuition costs (maintenance costs). Most of the tuition costs were paid for by the government. Figure 4.1 shows the taxonomy of the major private costs used in the study.

Foregone earnings had to be included in the analysis because 115 (33.5%) of our sample consisted of mature students. In terms of the personal demand calculus therefore, it was assumed that the earnings foregone played a major role in making a decision to go to university. The inclusion or exclusion of foregone earnings has been a debatable issue. Economists who have strongly argued for the inclusion of foregone earnings in the cost stream included Schultz (1963), Bowman (1966) and Blaug (1965). On the other hand, Vaizey (1962), Balough and Streeten (1963) and Merrett (1966) favoured its exclusion.

Private expenditures for longitudinal data were estimated from government statistics and the Ministry of

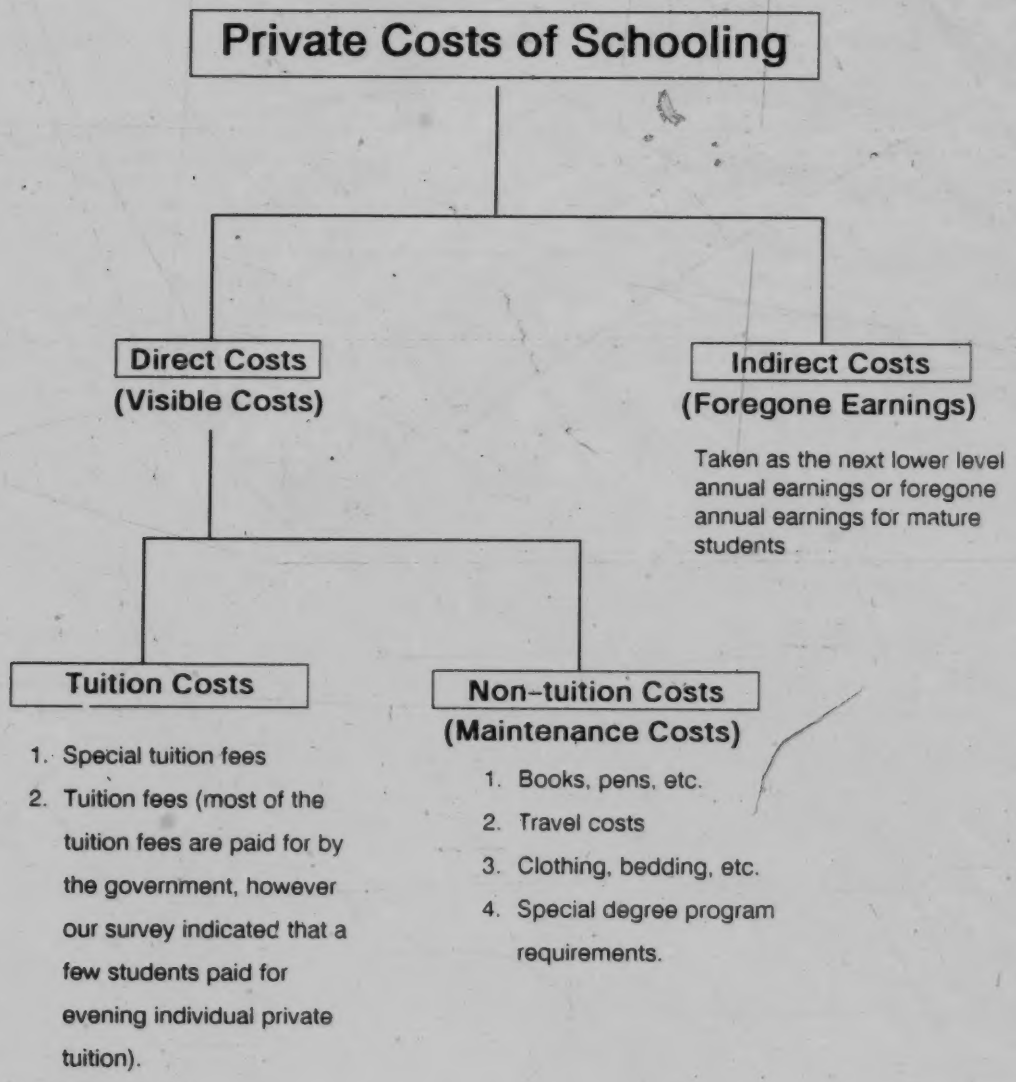
Private Costs of Schooling
Direct Costs
(Visible Costs)
Indirect Costs
(Foregone Earnings)
Taken as the next lower level annual earnings or foregone annual earnings for mature students
Tuition Costs
1. Special tuition fees
2. Tuition fees (most of the tuition fees are paid for by the government, however our survey indicated that a few students paid for evening individual private tuition).
Non-tuition Costs
(Maintenance Costs)
1. Books, pens, etc.
2. Travel costs
3. Clothing, bedding, etc.
4. Special degree program requirements.

**Figure 4.1. Taxonomy of Private Costs of University Schooling in Tanzania.**

Education basic facts on education unit costs. The foregone earnings were taken as the going salaries for form six graduates who did not go to university, plus an annual increment as stipulated in public pay scale conditions. For the cross-section data, the average private costs for an age group were computed from the figures given by the respondents.

The sample average private costs by degree program, by gender and by nature of university entry were compared. The t-test was used to determine whether the differences between direct costs means, opportunity costs means by gender, and nature of entry into university could be expected by chance. This procedure enabled the researcher to test whether there was a statistically significant difference between groups' (men, women; and mature, direct) average costs. Analysis of present values of costs was made by degree programs. The present values of costs were calculated by use of the relationships:

Present value of unadjusted direct private costs,[1]

$$= \sum_{t=-s}^{t=0} Cp(1+r)^{-t} \qquad (1)$$

Present value of unadjusted indirect private costs,

$$= \sum_{t=-s}^{t=0} Wp(1+r)^{-t} \qquad (2)$$

---

[1]Adjustments were made for inflation for pay scales data only. Inflation adjustment was not necessary for cross-sectional data.

Present value of unadjusted total private costs,

$$= \Sigma(Cp + Wp)(1+r)^{-t} \qquad (3)$$

where,

t = time period;
s = length in years of degree program; and
r = discount rate, assuming values of 0.05, 0.08, 0.10, 0.13.[2]

Monetary Benefits by Degree Programs and Gender: Age-Experience Earnings Profiles

Only the monetary benefits associated with university schooling were studied. On the basis of pay scales data, age-earnings profiles were constructed for the period 1973-1986 by degree programs. It was assumed that university students did not enter into the labour market before the ages of: 24 for three-year degree programs, 25 for four-year degree programs, and 26 for five-year degree programs. These ages were derived by adding the school starting age to the primary school cycle length of eight years to the secondary school transition length of six years and the corresponding degree program cycle length.

The cross-sectional sample data age-earning profiles were constructed by using seven age categories of three years each, starting with the lowest age of 26.

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[2]The present values are calculated at different values of r, namely 0.05, 0.08, 0.10, 0.13, for comparative purposes. The Tanzania national discount rates have been varying between 0.08 to 0.15 for the period 1980-86.

Benefits profiles were also constructed by years of work experience after obtaining a degree. The maximum number of years of experience in the sample was 19. This period of 19 years was considered enough for purposes of the study since the most relevant period affecting the size of the private rates of return is the first 10 to 15 years of the benefit stream (Shortlidge, 1975).

The t-test was used to determine whether difference(s) between mean earnings for men and women, and mean earnings for mature and direct students could be expected by chance.

Present Values of Benefits and Average Rates of Returns

The earnings data were also analysed by discounting the present value of benefits and then computing average private rates of return for each of the degree programs.[3] In calculating the present value of benefits, external discount rates of 0.05, 0.08, 0.10 and 0.13 were used. Those discount rates were selected because they represented the long-term average discount rates operating in the Tanzania financial institutions.

The present values of benefits from pay scales data were calculated for the period 1973-1986. Both inflation

[3]The choice of one criterion over the other was not important here, because the objective was to discuss the performance of the university degree programs across different selected criteria.

adjusted and inflation unadjusted present values were calculated. For cross-sectional data, the present values of benefits were calculated for the age experience categories studied only. Projections were made using regression analysis techniques to estimate the missing earnings values in the relevant age experience categories. The study did not attempt any further estimation of future earnings such as lifetime earnings. The calculated present values therefore apply to the studied period only.

The average private rates of return from pay scale data adjusted and unadjusted for inflation were calculated for the period 1973-1986. These average private rates were compared with those calculated from the cross-sectional data for the eight degree programs studied. The findings on private average returns and present values were compared with the findings of other studies.

The calculations of private rates of return involved making a comparison of private costs with private benefits. This study, centered on the private costs of the resources which individuals put into their university degree programs in relation to the private benefits (earnings) expected in the future (as given by cross-sectional intertemporal data) or already earned as salaries (as given by 1974-1986 pay scales). The procedure used in this study was adopted from Psacharopoulos (1973).

Considering an investment project which has:

$\beta_t$ = Expected net benefits per year;
n years = Life time, "t"; and
r = Internal Rate of Return.

Then n:

$$\sum_{t=1}^{n} \frac{\beta_t}{(1+r)^t} = 0. \qquad (4)$$

By analogy, then, the average private rate of return for a given degree program in Tanzania was defined by comparing the private costs and the private benefits associated with it. More formally, we considered a university degree program instead of a project. The costs were:

Cp = Direct private costs;
Wp = Indirect private costs (foregone earnings); and
Cp + Wp = Total private costs.

The average benefits were the differential between earnings of a university [degree program] graduate (Wu) and the earnings of a minimum wage earner in Tanzania."

$$Wp = Wu - Wp.$$

If the length of study at university for a degree program was, say, four years, and assuming that pay scales (or age-earnings cross-sectional data) were available for a period of 12 years or 12 age-earnings categories, the unadjusted private rate of return to investment in this four-year degree program was given by solving the equation:

$$\sum_{t=-3}^{0} (Cp + Wp)_t(1+r)^{-t} = \sum_{t=1}^{12} (Wu - Wp)_t(1+r)^{-t} \qquad (5)$$

Costs part - all costs are cumulated forward to year 0.

Benefit part - all benefits are discounted back to the same point in time.

The definition of the variables in equation (5) depended on the two approaches used. For cross-sectional data, Cp represented the average private costs for each degree program for an age group or years of experience category; Wp represented the average minimum wage computed for both urban and rural workers in 1986, and Wu represented the average earnings for each degree program by age group or work experience category.

## Adjustments

### Adjustments for Ability

The benefits data are reported in two forms for comparative reasons. First, the unadjusted data in which the proportion of differential earnings attributable to education is taken to be 1.0. Second, adjusted benefits data were computed by assuming a low value for the alpha coefficient (Blaug, 1971). Denison (1964) used an alpha coefficient varying from 0.6 for secondary school leavers to 0.66 for those with higher education to take account of the fact that some of the observed differentials associated

with schooling are attributable to individual differences in ability and family environment.

A few studies conducted on the low income countries asserted that the effect of schooling on earnings is greater in these countries than in high income countries such as the United States (Blaug. 1965; Carnoy et al. 1978). It was therefore not legitimate to apply an American alpha coefficient to Tanzanian earnings. On the other hand, the number of university graduates in the Tanzania labour force is very small. This observation alone calls for a premium on university education in Tanzania, and hence we used a higher value of alpha equal to 0.89 as suggested by Heyneman (1980) in the case of Malawi, and Thias and Carnoy (1969) in the case of Kenya.

Adjustment for Economic Growth

Our cross-sectional earnings data were based on a sample of respondents. These cross-sectional age earnings profiles do not truly represent future earnings profiles. Given a positive economic growth, future earnings are usually expected to be higher.[4] The future earnings were therefore obtained by inflating the cross-section earnings profiles by the average rate of economic growth for the

[4]There are many other reasons why each cohort's life history of income should be different: wars, depressions, reduction in illnesses, extension of average length of life.

period 1980-1986 of 2.7 percent, as obtained from the Ministry of Planning and Finance Statistics.

Adjustment for Mortality

Adjustments for mortality were not made because of the following reasons: First, the age-specific mortality rates by schooling levels were not available. Second, the sample studied consisted of university graduates between the ages 26 to 45. This group has a very low mortality rate. Further, as argued by Antonovsky (1967) and Tilak (1987), the time at which one dies is related to one's class. Since education "reduces mortality through increased knowledge about health, sanitation and medical care, the rates of mortality for the educated would be much less and hence their impact on the size of rates of return could be taken to be negligible" (Tilak, 1987, p. 72).

Adjustment for Inflation

The current costs and earnings figures from pay scales were adjusted for inflation by use of the relationship:

$$\frac{\text{Real Earnings (Costs) in year "t"}}{\text{Cost of living index in base year}^5\ (1974)} =$$

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[5]The consumer price index for goods consumed by urban middle class workers was used. Most university graduates in Tanzania belong to this group of workers. Figures were taken from the Ministry of Planning and Finance Economic Surveys.

Current Earnings (Costs) in year "t"
Cost of living index in year "t"

Adjustment Effects

The above adjustment affected the benefits and returns differently. The adjustment for economic growth raised the returns, while all the other adjustments pulled them down. With these adjustments our cross-sectional data present value benefits formula became:

Present value of benefits ($pv\beta$)

$$= \sum_{t=1}^{n} \alpha \frac{\beta t (1+g)^t}{(1+r)^t} \qquad (6)$$

where,

$\alpha$ = alpha coefficient adjustment; and
g = growth rate adjustment.

Summary

This chapter describes the internal rate of return methodology used in the present study. It was shown that cost-benefit analysis was used to study the monetary benefits by age, gender, work experience and university degree programs. The approach was also used to study the behaviour of private costs by degree programs. Lastly, the methods used in computing the present values of costs and benefits and the private rates of return for the degree programs were described.

# CHAPTER V

## PRESENTATION AND DISCUSSION OF THE FINDINGS ON PRIVATE COSTS

This chapter presents and discusses the research findings related to private costs. The analysis addresses the first two research subproblems as presented in Chapter I. The pay scales, government statistics and cross-section sample data contributed information relevant to the two subproblems. The analysis also gives a discussion of the findings of other studies, along with comments from the respondents who were interviewed.

### Private Costs

Private costs were considered under three broad categories: the direct private costs or visible costs (direct private expenditures), indirect private costs or opportunity costs, and the total private costs. The direct private costs consisted of tuition costs and non-tuition costs while the indirect private costs consisted of the foregone earnings. Mature students' foregone earnings were assumed equal to the last annual earnings before joining university training. The direct students' foregone earnings were assumed to be equal to the annual earnings they would have obtained if they had joined direct

employment after form six graduation as given in the public pay scales.

Private Costs by Degree Programs

Subproblem 1.0

How do the amounts of direct private costs and indirect private costs compare across the degree programs?

Tables 5.1 and 5.2 show the amounts of the three categories of private costs for each degree program. The degree programs were ranked by sizes of the direct private costs, indirect private costs and by total private costs. The magnitude and nature of the relationship between the rank orders was established by use of a Spearman's rank order formula. The rank correlation $r_s$ was calculated by use of the Spearman's formula, namely:

$$r_s = 1 - \frac{6\Sigma di^2}{n(n^2-1)}$$

where n = number of degree programs studied; and

di = the difference between ranks for any pair of degree program ranks.

In terms of amounts of the direct private costs, the government data estimates gave the following in rank order from highest to lowest: 1. Medicine (Tsh. 9641); 2. Engineering (Tsh. 7996); 3.5. Science Education (Tsh. 5896); 3.5. Science General (Tsh. 5896); 5.5. Arts Education (Tsh. 5295); 5.5. Arts General (Tsh. 5295); and 8. Agriculture (Tsh. 5226). The rank ordering by indirect

Table 5.1

Adjusted Private Costs by Degree Programs Estimated from Government Data in Tanzania Shillings

| Degree Program | Direct Private Costs (1) | | Indirect Private Costs (2) | | Total Private Costs (3) | | % (1) is of (3) |
|---|---|---|---|---|---|---|---|
| | Cost | Rank | Cost | Rank | Cost | Rank | |
| B.A. (Ed.) | 5295 | 6 | 35195 | 7 | 40490 | 7 | 13.1 |
| B.A. (Gen.) | 5295 | 6 | 35195 | 7 | 40490 | 7 | 13.1 |
| B.Sc. (Ed.) | 5896 | 3.5 | 41882 | 4.5 | 47778 | 4.5 | 12.3 |
| B.Sc. (Gen.) | 5896 | 3.5 | 41882 | 4.5 | 47778 | 4.5 | 12.3 |
| LL.B. | 5295 | 6 | 35195 | 7 | 40490 | 7 | 13.1 |
| B.Sc. (Eng.) | 7996 | 2 | 63200 | 2 | 71196 | 2 | 11.2 |
| B.Sc. (Agr.) | 5226 | 8 | 47389 | 3 | 52165 | 3 | 9.9 |
| M.D. | 9641 | 1 | 90090 | 1 | 99731 | 1 | 9.6 |

Note: Spearman rank-order correlation coefficient between direct and indirect costs of various degree programs = .620 with p = .050 (critical r = .643)

Table 5.2

Mean Private Costs by Degree Programs as Given by Respondents

in Tanzania Shillings

| Degree Program | Direct Private Costs (1) | | Indirect Private Costs (2) | | Total Private Costs (3) | | % (1) is of (3) |
|---|---|---|---|---|---|---|---|
| | Cost | Rank | Cost | Rank | Cost | Rank | |
| B.A. (Ed.) | 4040 | 4 | 37137 | 8 | 41177 | 7 | 9.8 |
| B.A. (Gen.) | 4723 | 2 | 41745 | 6 | 46468 | 5 | 10.2 |
| B.Sc. (Ed.) | 3062 | 7 | 37769 | 7 | 40831 | 8 | 8.1 |
| B.Sc. (Gen.) | 3321 | 6 | 42885 | 4 | 46206 | 6 | 12.3 |
| LL.B. | 5089 | 1 | 42096 | 5 | 47183 | 4 | 12.1 |
| B.Sc. (Eng.) | 4548 | 3 | 61108 | 1 | 65656 | 1 | 6.9 |
| B.Sc. (Agr.) | 3657 | 5 | 44253 | 3 | 47910 | 3 | 7.6 |
| M.D. | 2608 | 8 | 60155 | 2 | 62763 | 2 | 4.2 |

Note: Spearman rank-order correlation coefficient between direct and indirect costs of various degree programs = -.143 with p = .368 (critical r = .643)

private costs was as follows: 1. Medicine (Tsh. 90,090); 2. Engineering (Tsh. 63,200); 3. Agriculture (Tsh. 47,389); Science Education (Tsh. 41,882) and Science General (Tsh. 41,882) both tied for rank 4.5; Arts Education (Tsh. 41,882), Arts General (Tsh. 41,882) and Law (Tsh. 41,882) all tied for rank 7. The Spearman rank order coefficient for these ranks was 0.65, which was positive and high, indicating that, according to government estimates the degree programs with high (low) private direct costs had high (low) indirect private costs.

Data for the cross-sectional sample are shown in Table 5.2. The rank ordering of these direct private costs was as follows: 1. Law (Tsh. 5089); 2. Arts General (Tsh. 4723); 3. Engineering (Tsh. 4548); 4. Arts Education (Tsh. 4040); 5. Agriculture (Tsh. 3657); 6. Science General (Tsh. 3321); 7. Science Education (Tsh. 3062); and 8. Medicine (Tsh. 2608). The sample rank ordering of indirect private costs was: 1. Engineering (Tsh. 61,108); 2. Medicine (Tsh. 60,155); 3. Agriculture (Tsh. 44,253); 4. Science General (Tsh. 42,885); 5. Law (Tsh. 42,096); 6. Art General (Tsh. 41,745); 7. Science Education (Tsh. 37,769); and 8. Arts education (Tsh. 41,745). The rank order coefficient for these sample ranks was -0.1, indicating a low negative relationship. One implication of this low negative correlation was that, according to respondents, degree programs with high (low) private direct expenditures were

not necessarily the same degree programs with high (low) indirect (opportunity) costs.

Ranking by total private costs indicates that the government estimates gave the following rankings: 1. Medicine (Tsh. 99,731); 2. Engineering (Tsh. 71,196); 3. Agriculture (Tsh. 52,615); 4.5. Science General (Tsh. 47,778); 4.5. Science education (Tsh. 47,778); 7. Arts Education (Tsh. 40,490); 7. Arts General (Tsh. 40,490); and 7. Law (Tsh. 40,490). The respondents' data on total private costs gave the following rankings: 1. Engineering (Tsh. 65,656); 2. Medicine (Tsh. 62,763); 3. Agriculture (Tsh. 47,910); 4. Law (Tsh. 47,183); 5. Arts General (Tsh. 46,468); 6. Science General (Tsh. 46,206); and 7. Science Education (Tsh. 41,177). The rank order coefficient between the government estimated total private costs by degree program and the total private costs as given by respondents was statistically significant and equal to 0.65, indicating a general trend that degree programs ranked high (low) on total private costs in government statistics were found to rank high (low) on total private costs as given by respondents.

The findings in Tables 5.1 and 5.2 indicate further that the government statistics when compared with the sample values gave higher total private costs for medicine, agriculture, engineering, science general, and science education. In terms of government statistics, education

and the science degree programs cost the individual more than the arts general degree programs. There were some differences between degree programs' direct private costs. For example, students in the law degree program incurred a high of Tsh. 5089 on direct private expenditures while those in medicine incurred the lowest value of Tsh. 2608. However, despite these differences, a one-way analysis of variance (Anova), the results of which are indicated in Table 5.3, showed that the differences in mean direct costs by degree programs were not statistically significant at $p = 0.05$.

The amounts of the direct private costs by degree programs were consistently smaller than the corresponding opportunity (indirect) costs. The differences between the average opportunity costs for the various degree programs were statistically significant at $p = 0.05$ as shown in Table 5.4. Therefore, while the differences in private direct expenditures for the various degree programs could be ignored on statistical grounds, the differences in opportunity costs for the programs were statistically significant and thus could not be ignored.

Since the differences in mean opportunity (indirect) costs were statistically significant, we decided to pinpoint these differences. And since the group sizes for these degree programs were unequal, we used the Scheffe S Test. Applying the Scheffe test to our data in Table

Table 5.3

Analysis of Variance Results for Direct Private Costs

by Degree Programs

| Source | df | Sum of Squares | Mean Squares | F-Ratio | F Prob. |
|---|---|---|---|---|---|
| Between Groups | 7 | 145868933.1 | 20838419.01 | .9845 | .4447* |
| Within Groups | 153 | 3238545280 | 21166962.61 | | |
| Total | 160 | 3384414213 | | | |

* Not significant at p = .05

Table 5.4

Analysis of Variance Results for Foregone Earnings

by Degree Programs

| Source | df | Sum of Squares | Mean Squares | F-Ratio | F Prob. |
|---|---|---|---|---|---|
| Between Groups | 7 | 17402263811 | 2486037687 | 2.5782 | .0137* |
| Within Groups | 275 | 2.6516E+11 | 964235246.6 | | |
| Total | 282 | 2.8257E+11 | | | |

* Significant at p = .05

5.4, we obtained ranges from p = 0.100 level to p = 4.93. The pairs of degree program opportunity costs which were significantly different at p = 0.100 level were: (a) engineering (Tsh. 61108) and arts education (Tsh. 37136); (b) medicine (Tsh. 60153) and arts education (Tsh. 37136); and (c) engineering (Tsh. 61108) and science education (Tsh. 38770).

The above findings were confirmed by the interviews with respondents. Respondents indicated that their private direct expenses were very small. An arts education graduate observed that:

> I incurred absolutely nothing. My family (parents) did not have to strain themselves to pay for my university education. I cannot complain that my family suffered because of my schooling. In fact, I could afford to buy some few items for my family while studying at university.

The direct private costs were low across the degree programs. The lawyers appeared to have incurred relatively high expenses; however, one of them observing that:

> Private direct costs were negligible. Everything was paid for by the government: Accommodation, food, books. I could save money from the bursary to buy extra clothes. My family could not have been able to pay for my university education costs. The private direct costs were very little indeed. I <u>cannot pride myself that I incurred direct private costs</u>. [my emphasis]

The finding that opportunity costs represented a large fraction of private costs across all degree programs was supported by the views of the respondents. One medical doctor revealed that, in terms of opportunity costs, the

medical degree cost more than other degree programs. He argued that:

> . . . compared to my colleagues in engineering and arts degrees, I always felt that time cost me a lot. Five years in books and wards. One extra year as an intern; a total of six years. You know, I was already 27 when I graduated. I have never attained an economic status equivalent to the time I invested . . . my academic achievements have never equaled my economic status. It has been quite long to attain where I am now.

The decision to enroll in higher education involves social costs. In this regard, another concept of opportunity costs was expressed by a graduate teacher who entered university training directly from secondary school:

> My mother was old and ill by the time I passed my form six examination. She had paid for my primary and secondary education through the sales of local beer she brewed monthly. If I had gone to direct employment I would have supported her financially. She had cancer and died when I was in my second university year. Maybe if I had not gone to university I would have paid for her treatment. My mother's death was my cost.

## Discussion on Private Costs

### Direct Private Costs

The results of the foregoing analysis are mixed regarding the different private costs incurred for the various degree programs. But some common features can be identified for discussion purposes.

The mean direct private expenditures by degree programs were not statistically different. This finding

can be explained by the fact that, in Tanzania, university schooling is highly subsidized by the central government. Not only are the direct private expenditures low, they are also almost equal across the various degree programs.

The above findings are similar to those found by Psacharopoulos (1987) in the case of Colombia and Tanzania. In his study, direct private expenditures were very low in public as compared to private schools where students had to pay fees in addition to expenditures on transportation, bedding, clothing and other non-tuition needs. Blaug's (1976) study on the rate of return on investment in education in Thailand indicated that, for university education, the ratio of direct private costs to direct social costs was 0.18--lower than the ratios for elementary and secondary levels which were 0.46 and 0.83, respectively. A recent study by Tilak (1987) also indicated that, in India, private costs profiles were lowest for degree level education when compared to primary, secondary and intermediate levels.

Opportunity Costs

The differences between the mean opportunity costs by degree programs were found to be large and statistically significant. The opportunity costs reflect the value of students' time. Time as a resource is scarce and a factor in both individual and social educational investment planning.

The opportunity costs for direct students were approximated as equal to the earnings which they would have obtained if they had taken employment directly upon completing secondary school. Therefore, some of the differences in opportunity costs can be explained by the salary earnings policies in Tanzania. The salary-earnings for science students are usually higher than those of arts students at the start of employment. This is a deliberate attempt by the government to encourage young people to study science-based subjects rather than the social sciences and humanities. Generally then, the science degree programs had high opportunity costs.

Medicine, engineering and agriculture had high opportunity costs because of the high starting annual salaries given to the direct employed form six science students, but also because these degree programs take four to five years to complete--longer than the other degrees. The foregone earnings for these degree programs are closely related to the earnings of comparable science workers in the labour market, which are usually higher than those employed in arts related jobs.

The opportunity costs were higher than the corresponding direct expenditures. Therefore the opportunity costs were the major contributor to the total private costs. This finding contradicts Tilak's (1987, p. 82) observations for India, namely

> Even though the foregone earnings of the higher general and higher professional education are the same in absolute terms, as a percent of total costs, they are less at the higher professional level because of a relatively large component of private expenditure in the total costs.

The major reason for the difference is that, in Tanzania, private direct expenditures are low, while in India they are high, indicating differences in the degree of state subsidization at a higher education level in the two countries. In fact, in Tanzania like in Thailand (Blaug, 1976, p. 336):

> Of all three levels of education, it is higher education that is most heavily subsidized by the state; nevertheless, because of the earnings foregone, even university students do in fact pay most of the total costs of tertiary education.

If this is the case, then, opportunity costs play a great role in influencing the decision to enroll in a particular degree program. This is close to Gordon and Williams' (1976) study findings which showed that "comparisons of estimated foregone income and potential future earnings reveal a high subjective rate of return, which is consistent with the decision to attend school. Many students volunteer foregone income as the principal cost of schooling" (p. 73).

Summary of Findings Related to Subproblem 1.0

This part of the study provided the results of the analysis of direct costs and indirect costs by degree programs. The direct private expenditures were very low relative to the opportunity costs which contributed a large part of the total private costs. Degree programs which had long training periods had high opportunity costs. The addition of qualitative data indicated that individuals perceive the opportunity costs to be higher than the direct costs.

Subproblem 2.0

How do the amounts of the direct private costs and indirect private costs compare by gender and nature of entry into university?

The comparison was between the direct private costs and indirect private costs by gender and nature of entry into university. Students who went to university immediately after Form VI studies were termed direct entrants. Students who joined the university following a period of employment were termed mature entrants. The findings related to this subproblem gave an overall picture of the data after taking out degree programs with low female numbers.

Engineering, agriculture and medicine had very few female students. These degree programs were therefore taken out of the pool for the gender analysis. The findings for the gender analysis, therefore, apply to the

following degree programs: arts education, arts general, science education, science general, and law. Agriculture and medicine had very few mature students compared to other programs. These two degree programs were omitted in the nature of entry analysis because their low mature student sample sizes would have affected the results.

Direct Private Costs and Opportunity Costs by Gender

Table 5.5 gives the t-tests, comparing average aggregate direct private costs and opportunity costs by gender. Two null hypotheses were tested, namely that: (a) the mean direct private costs for male and female groups were equal; and (b) the mean opportunity costs for male and female groups were equal.

The F-ratio for direct private costs equaled 1.09, and the probability associated with this ratio was 0.720. Testing at the 0.05 level, we accepted the null hypothesis of equal variance. It was likely that these two groups were drawn from populations in which the variances were equal. Using a pooled variance estimate (a t-test assuming equal variances), the probability associated with the t-value of 0.36 was 0.717, indicating that the second null hypothesis could not be rejected. Therefore, we concluded that the differences in average private costs by gender were not statistically significant. The two female and

Table 5.5

Comparison of Direct Private Costs and Opportunity Costs by Gender

| | N | Average Costs | Standard Deviation | Standard Error |
|---|---|---|---|---|
| Direct Private Costs | | | | |
| Male | 78 | 4399 | 4744 | 537.1 |
| Female | 49 | 4079 | 4957 | 708.2 |
| Opportunity Costs | | | | |
| Male | 135 | 41852 | 31008 | 2668.8 |
| Female | 78 | 38614 | 13909 | 1574.9 |

| | | | Pooled Variance Test | | | Separate Variance Test | | |
|---|---|---|---|---|---|---|---|---|
| | F-Value | 2-Tail Prob. | T-Value | df | 2-Tail Prob. | T-Value | df | 2-Tail Prob. |
| Direct Private Costs | 1.09 | .720 | 0.36 | 125 | .717 | 0.36 | 98.74 | .720 |
| Opportunity Costs | 4.97 | .000 | 0.87 | 211 | .384 | 1.04 | 201.13 | .297 |

male samples could have been drawn from populations in which the mean direct private costs were identical.

The F-ratio for opportunity costs by gender equaled 4.97 and the probability associated with that ratio was 0.000. Testing at the 0.05 level, we rejected the null hypothesis of equal variance. It was unlikely that these two groups were drawn from populations in which the opportunity cost variances were equal. Assuming unequal variances and using a separate variance estimate, we obtained t-value of 1.04 significant at 0.297. Testing once again at p = 0.05 level, we accepted the null hypothesis of equal variance. It was likely that the opportunity costs by gender were drawn from male and female groups in which the mean opportunity costs were equal.

Direct Private Costs and Opportunity Costs by Nature of Entry into University

Table 5.6 shows t-tests comparing direct private costs and opportunity costs by nature of entry (mature student or direct entry) into university. Two null hypotheses were tested, namely that: (a) the mean direct private costs for direct and mature students were equal; and (b) the mean opportunity costs for direct entry and mature students were equal.

The F-ratio for average direct private costs by nature of entry into university was 1.40 at p = 0.151. With the critical value set at p = 0.05 level, we accepted

Table 5.6

Comparison of Direct Private Costs and Opportunity Costs
by Nature of Entry (Direct or Mature) into University

| | N | Average Costs | Standard Deviation | Standard Error |
|---|---|---|---|---|
| Direct Private Costs | | | | |
| Direct | 84 | 3964 | 4371 | 476.9 |
| Mature | 64 | 4786 | 5171 | 646.4 |
| Opportunity Costs | | | | |
| Direct | 159 | 41784 | 35733 | 2833.8 |
| Mature | 94 | 47604 | 27007 | 2785.5 |

| | | | Pooled Variance Test | | | Separate Variance Test | | |
|---|---|---|---|---|---|---|---|---|
| | F-Value | 2-Tail Prob. | T-Value | df | 2-Tail Prob. | T-Value | df | 2-Tail Prob. |
| Direct Private Costs | 1.40 | .151 | -1.05 | 148 | .297 | -1.02 | 122.66 | .308 |
| Opportunity Costs | 1.75 | .004 | -1.36 | 251 | .174 | -1.96 | 236.20 | .044 |

the null hypothesis of equal variance. It was likely that the average direct private costs by nature of entry into university were drawn from populations in which the variances were equivalent. A pooled variance estimate indicated that the probability associated with a t-value of -1.05 was 0.297; thus the null hypothesis could not be rejected. The differences in average direct private costs incurred by direct entry and mature students were not statistically significant. The direct private costs could have been drawn from equivalent direct entry and mature graduate samples.

The F-ratio for mean opportunity costs by nature of entry into university was statistically significant at $p = 0.004$, indicating unequal variances in opportunity costs. A separate variance estimate gave a t-value of -1.96 with a p-value of 0.044; thus the null hypothesis could not be rejected. The differences in mean opportunity costs by nature of entry into university were not statistically significant. The average opportunity costs could have been drawn from identical direct and mature graduate samples.

Discussion on Direct Private Costs and Opportunity Costs by Gender and Nature of Entry

The above findings on direct private costs by gender confirm what we have already discussed: that in highly subsidized educational systems, not only are the direct private expenditures among students low, the

variances in student spending patterns are also close to each other. However, our finding that the differences in average private direct expenditures by gender were not statistically significant contradicted a popular belief in Tanzania that university female students spend more money than males on maintenance items. The findings also contradict those by Tilak (1987, p. 95), in the case of India, that ". . . the private cost per student is higher for men than for women, except at secondary school level and at the higher level where the costs of women's education are about 20 percent more." A comparison between direct private costs and opportunity costs by gender is also drawn by Tilak who comments that ". . . the private expenditure on women's education, excluding foregone earnings, is less than that on men's education."

The factors that may have led to the above trend in Tanzania are probably different from those suggested by Tilak in the case of India. First, since few extra curricular activities are offered at the University of Dar-es-Salaam, male students who traditionally participated in more games, sports and social activities than female students spend less than they might have spent on these activities, which may be an important factor in equalizing expenditure on education. Second, since in Tanzania both women and men participate equally in the labor force because of positive discrimination policies in favour of

women,[1] parents and families incur the same private direct investment in male and female children. Third, in Tanzania, unlike in India and Thailand, there are no prevailing social customs and values that forbid women to leave their homes and stay in hostels or rented houses in the city. Therefore, women students spend as much as men on boarding and lodging related to their university education. Finally, since university education is highly subsidized, it is possible that students' private expenditures are negligible as they are virtually dependent on government funding.

The differences in average opportunity costs by gender and nature of entry into university were not statistically significant. An explanation can be advanced for this finding: to some degree this finding is a reflection of how the opportunity costs were estimated. It was assumed that the foregone earnings by a direct university graduate are equal to the pay-scale salary earnings of a Form VI graduate who went into direct employment. This procedure gives the same foregone earnings to male and female graduates. The small earnings

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[1]Tanzania government policy papers indicate that discrimination against women's education and associated labour market monetary benefits in the modern sector of the economy has been arrested. Evidence for this can be seen in the Lindi Resolution (LR) which relaxed the university entrance criteria in favour of women and the government Equal Opportunities Act which, among other things, forbade wage discrimination on the basis of gender.

differences that exist can be explained by the fact that most women are in the arts related professions for which the government pay scales are lower than they are in the sciences.

Summary of Findings Related to Subproblem 2.0

This part of the study has given the analysis of the direct private costs and indirect costs by gender and nature of entry into university.

The differences between mean direct costs (indirect costs) by gender were not statistically significant. The nature of entry into university did not seem to affect the magnitude of the average private costs.

If our findings are correct, the low amounts of private costs incurred by individuals indicate that university schooling in Tanzania is highly subsidized. In this case, then, private demand for university schooling ought to be high, since it appears that academic ability and not private costs is the major determinant of entry.

# CHAPTER VI

# PRESENTATION AND DISCUSSION OF FINDINGS RELATED TO EARNINGS AND BENEFITS PROFILES

## Introduction

This chapter presents and discusses the research findings related to earnings and benefits profiles by degree programs, gender and nature of respondents' entry into university study. Public pay scale (as approximation to longitudinal data) and cross-sectional earnings data were used in the analysis associated with the subproblems. Appendices D1 to D8 give inflation adjusted and inflation unadjusted earnings profiles from public pay scales for the period 1974 to 1987. A summary of inflation unadjusted earnings is shown in Table 6.1. Tables 6.2 and 6.3 show the cross-sectional earnings for the study sample distributed by degree program. Table 6.2 shows the earnings by age categories, while Table 6.3 gives the earnings by years of experience after obtaining a degree.

The empty spaces in the cross-sectional data indicate that the corresponding average earnings in these age and experience categories could not be computed because of lack of respondents. In later calculations, these empty

spaces were filled in by use of regression analysis techniques.

Subproblem 3.0

What is the pattern of age (experience) earnings profiles by degree programs?

Earnings Profiles from Pay Scales

The unadjusted earnings profiles from pay scales by degree program shown in Table 6.1 indicate that, except for science education and science general, graduates who started with a salary of Tsh. 18,630, the other degree program graduates had different starting points. The starting point for medicine graduates was the highest at Tsh. 25,320; engineering was the second highest at Tsh. 22,310; while agriculture and arts general occupied the third rank, each with a starting salary of Tsh. 19,140. Science education and science general ranked fifth. Arts education graduates at Tsh. 17,700 had rank of seven, while the lawyers with a starting salary of Tsh. 17,040 had the eight and lowest rank.

All the year-earnings profiles from pay scales, as shown in Table 6.1, rose with time. Although there were variations in starting salaries in 1974, by 1987 the earnings were the same for the following degree programs: arts education, arts general, science education, science

Table 6.1

Year-Earnings Profiles from Pay Scales by Degree Programs

in Tanzania Shillings

| Year | B.A. Education | B.A. General | B.Sc. Education | B.Sc. General | LL.B. | B.Sc. Engineering | B.Sc. Agriculture | M.D. |
|---|---|---|---|---|---|---|---|---|
| 1974 | 17700 | 19140 | 18360 | 18360 | 17040 | 22310 | 19140 | 25320 |
| 1975 | 18360 | 19980 | 19140 | 19140 | 17700 | 23400 | 19980 | 26400 |
| 1976 | 19140 | 20580 | 19980 | 19980 | 18360 | 24240 | 20580 | 27420 |
| 1977 | 22380 | 22380 | 22380 | 22380 | 22380 | 32100 | 22380 | 32100 |
| 1978 | 23460 | 23460 | 23460 | 23460 | 23460 | 33180 | 23460 | 33180 |
| 1979 | 24240 | 24240 | 24240 | 24240 | 24240 | 34320 | 24240 | 34320 |
| 1980 | 25320 | 25320 | 25320 | 25320 | 25320 | 37800 | 25320 | 37800 |
| 1981 | 38520 | 38520 | 38520 | 38520 | 38520 | 46920 | 38520 | 46920 |
| 1982 | 39840 | 39840 | 39840 | 39840 | 39840 | 48540 | 39840 | 48540 |
| 1983 | 41160 | 41160 | 41160 | 41160 | 41160 | 49680 | 41160 | 49680 |
| 1984 | 54060 | 54060 | 54060 | 54060 | 54060 | 59400 | 54060 | 59400 |
| 1985 | 55680 | 55680 | 55680 | 55680 | 55680 | 60480 | 55680 | 60480 |
| 1986 | 57300 | 57300 | 57300 | 57300 | 57300 | 61980 | 57300 | 61980 |
| 1987 | 77400 | 77400 | 77400 | 77400 | 77400 | 80400 | 77400 | 80400 |

Source: Compiled from Appendix C: Employers' Data Sheets.

Table 6.2

Average Earnings (Benefits) by Degree Programs and Age Groups

| Age | B.A. Education | B.A. General | B.Sc. Education | B.Sc. General | LL.B. | B.Sc. Engineering | B.Sc. Agriculture | M.D. |
|---|---|---|---|---|---|---|---|---|
| 26 or younger | --- | --- | --- | --- | 30300 | --- | --- | --- |
| 27 - 29 | --- | 35244 | 33221 | 34476 | 28511 | 29940 | 22800 | 43500 |
| 30 - 32 | 31108 | 27603 | 28868 | 28874 | 28616 | 35366 | 34560 | 48000 |
| 33 - 35 | 25416 | 36283 | 30654 | 26349 | 33418 | 42320 | 32066 | 40087 |
| 36 - 38 | 33770 | 35693 | 35332 | 32576 | 39325 | 37650 | 31335 | 36000 |
| 39 - 41 | 37966 | 47015 | 35343 | --- | 39188 | 47300 | 27407 | 44040 |
| 42 or older | 46347 | 38159 | 43110 | --- | 48595 | --- | 32277 | |

Table 6.3

Average Earnings (Benefits) by Degree Programs and Years of Experience

| Years of Experience | B.A. Education | B.A. General | B.Sc. Education | B.Sc. General | LL.B. | B.Sc. Engineering | B.Sc. Agriculture | M.D. |
|---|---|---|---|---|---|---|---|---|
| 1-2 | 28800 | 28589 | 22800 | 29307 | 34554 | 39493 | --- | 42000 |
| 3-4 | 28264 | 36591 | 33091 | 32801 | 29050 | 32991 | 26688 | --- |
| 5-6 | 33910 | 29618 | 35829 | 28839 | 30744 | 37287 | 33020 | 27000 |
| 7-8 | 33628 | 35400 | 28303 | 37918 | 38089 | 53247 | 29515 | 45000 |
| 9-10 | 47580 | 33265 | 35386 | 41887 | 50256 | 40127 | 32562 | 37908 |
| 11-12 | 42029 | 40930 | 39111 | --- | 38858 | 47650 | 36432 | 44540 |
| 13-14 | 43733 | 47403 | 33293 | --- | 72000 | --- | --- | 44040 |
| 15-16 | 41696 | 41512 | 35412 | --- | --- | --- | --- | --- |
| 17-18 | 40333 | 46424 | 42572 | --- | --- | --- | --- | --- |
| 19 or more | 46322 | --- | --- | --- | 63144 | --- | --- | --- |

general, law, and agriculture, at Tsh. 77,400. Medicine and engineering had the highest 1987 earnings at Tsh. 80,400.

Table 6.1 indicates further that medicine and engineering graduates earned more at every stage than those graduates with other degree qualifications. However, for all degree programs, the annual earnings systematically increased with time. Further, the differentials grew smaller and smaller with every advance in age.

The above picture from the 1974-1987 pay-scale earnings appeared to be supported by one of the graduates when he observed that:

> Usually graduates are given equal starting points taking into account existing regulations depending on one's degree program. However, an employee who has served for three years without mistakes has to be promoted. He jumps from one salary scale to another. After six years, we find similarities of salaries for all graduates regardless of what they started with.

The above observation represented an ideal situation. In fact, graduates--even those within the same degree program --did not get the same earnings. While some "jumped" from one salary scale to another, others did not "jump" at all as shown by our cross-section sample data below.

Earnings Profiles from Cross-sectional Sample Data

The age average-earnings profiles of age as obtained from cross-sectional data did not follow the traditional pattern. The earnings profiles rose and fell

depending on the age category, as shown in Table 6.2. Some higher age categories had lower earnings than those obtained in the lower age category for the same degree program. For example, Table 6.2 indicates that: (a) graduates in the 33 to 35 age category of the education arts degree obtained lower earnings than those in the 30 to 32 age category; (b) doctors in the 39 to 41 age group obtained lower average earnings than those in the younger, 36 to 38 age category; (c) in agriculture, the 39 to 41 age group obtained lower average earnings than all the younger age categories; and (d) the science education graduates in the 30 to 32 age category had lower average earnings than their counterparts in the 27 to 29 age category.

Table 6.2 shows the following specific findings: (a) the law graduates in the 42 and above age category had the highest average earnings of Tsh. 48,595; (b) agriculture graduates in the 42 and above age category had the lowest average earnings of Tsh. 32,377; (c) medicine and engineering also ranked high in terms of average earnings at ages 39 and above.

A comparison of the cross-sectional earnings findings in Tables 6.2 and 6.3 and the pay-scale earnings in Table 6.1 indicated that: first, pay-scales earnings profiles underestimated the starting salaries of the university graduates. This finding suggested that the employers were paying higher starting salaries than those

stipulated in the government pay scales. Second, the pay-scale earnings profiles rose faster than the cross-sectional earnings, an indication that few graduates were being promoted to the super scales given in the government pay scales. Third, lawyers and arts graduates in the sample were earning higher salaries than the government pay scale suggestions; the government pay scales appeared to favour engineers and medical doctors. Fourth, the medical doctors' and the engineers' earnings generally ranked high on both pay scales and cross-section earnings data.

As indicated earlier, Tables 6.2 and 6.3 show that some degree program earnings columns were empty. This is because the sample did not include respondents in these age categories. In order to fill the gaps, a regression adjustment procedure was used because no better adjustment procedure could be devised at the time. Scatter diagrams were used to spot the "outliers" in each degree program. These outliers, provided they were not more than ten percent of the sample, were taken out. Table 6.4 gives the benefits by degree program and experience, after the above adjustments were made.

Four earnings functions were tried. These were: age-earnings function, age-Ln (earnings) function, experience-earnings function, and experience-Ln (earnings) function. Table 6.5 gives the results of the bivariate regression analysis taking age or experience as independent

Table 6.4

Benefits by Degree Programs and Years of Experience

(Outliers removed and growth rate adjusted)

| Years of Experience | B.A. Education | B.A. General | B.Sc. Education | B.Sc. General | LL.B. | B.Sc. Engineering | B.Sc. Agriculture | M.D. |
|---|---|---|---|---|---|---|---|---|
| 1-2 | 28800 | 28589 | 22800 | 29307 | 26991 | 29700 | 17110 | 11910 |
| 3-4 | 28264 | 31513 | 27620 | 27715 | 29050 | 32991 | 26688 | 15433 |
| 5-6 | 28469 | 29618 | 35829 | 28839 | 30744 | 37287 | 33020 | 27000 |
| 7-8 | 33628 | 35400 | 28303 | 37918 | 38089 | 36978 | 31046 | 45000 |
| 9-10 | 47580 | 33265 | 35386 | 41887 | 50256 | 40127 | 32562 | 37908 |
| 11-12 | 42029 | 40930 | 39111 | 63075 | 45688 | 47650 | 36432 | 44540 |
| 13-14 | 43733 | 47403 | 33293 | 70767 | 72000 | 75694 | 68997 | 44040 |
| 15-16 | 41696 | 50000 | 45264 | 78459 | 81250 | 85218 | 90354 | 80513 |
| 17-18 | 47000 | 46424 | 48575 | 86152 | 90343 | 94742 | 118621 | 111095 |
| 19 or more | 55083 | 95319 | 76090 | 93844 | 99432 | 104266 | 156032 | 153741 |

Table 6.5

Pearson Correlations of Earnings and Natural Logarithm of Earnings with Age and Experience by Degree Programs

| | Age | | | Experience | | |
|---|---|---|---|---|---|---|
| Degree Program | Earning | N | Ln of Earning | Earning | N | Ln of Earning |
| B.A. (Ed.) | .7467 | 41 | .7462 | .7097 | 35 | .7214 |
| B.A. (Gen.) | .5426 | 57 | .5410 | .5604 | 58 | .5299 |
| B.Sc. (Ed.) | .6711 | 36 | .6734 | .5822 | 35 | .5792 |
| B.Sc. (Gen.) | .1086 | 19 | .0547 | .5551 | 19 | .5051 |
| LL.B. | .7224 | 30 | .7353 | .7139 | 32 | .6706 |
| B.Sc. (Eng.) | .5426 | 36 | .5306 | .5431 | 34 | .5291 |
| B.Sc. (Agr.) | -.0065 | 18 | -.0252 | .5418 | 16 | .5442 |
| M.D. | -.0265 | 10 | -.0323 | .4398 | 8 | .4955 |

variables and earnings or Ln (earnings) as the dependent variable.

The regression results confirmed what had already been observed regarding the age-earnings profiles trends in Tanzania, namely: (a) the age-earnings profiles by degree programs did not follow the traditional pattern except for arts education ($r = 0.7467$), law ($r = 0.7224$), and science education ($r = 0.6711$); (b) the relationship between age and earnings was zero sided (zero order) for agriculture ($r = -0.0065$), and medicine ($r = -0.0265$); (c) the relationship between age and earnings was low but positive for science general ($r = 0.1086$), arts general ($r = 0.5426$), and engineering ($r = 0.5426$). Using a log transformation of the earnings data did not improve the results substantially.

Overall experience in years after obtaining a degree appeared to be a better predictor of future and past earnings than the age of respondents. The statistics in Table 5.11 indicate further that the relationship between experience and earnings was positive for all eight degree programs. As experience in years after obtaining a degree increased so too did the earnings. In particular, the pre-interpretation of Pearson's r squared in Table 5.11 indicated that experience explained 0.5037 of the variance in arts-education degree earnings, 0.3140 of the variance in arts general earnings, 0.4535 of the variance in science

education, 0.3088 of the variance in science general earnings, 0.5097 of the variance in law degree earnings, 0.2935 of the variance in engineering, 0.2932 of the variance in agriculture, and 0.1934 of the variance in medicine degree earnings. And, unlike the age-earnings relationships, the experience-earnings relationships were positive for all eight degree programs.

Figure 6.1 shows the line graphs for Table 6.5 experience-earnings profiles by degree programs. Unlike the age-earnings profiles, these experience earnings profiles followed the traditional pattern. They portrayed the following traditional characteristics: (a) earnings by degree programs were positively correlated with years of experience; (b) each profile tended to rise with years of experience; (c) initially the profiles were close to each other, but as the number of years of experience increased, profiles for medicine, agriculture, engineering and law rose faster and tended to be steeper than the others; (d) at 19 years of work experience after obtaining a degree, all eight degree profiles did not seem to have reached their peak earnings. In other words, a Tanzania university graduate had to work for more than 19 years before obtaining the peak earnings.

Figure 6.1. Benefits by Degree Program and Years of Experience

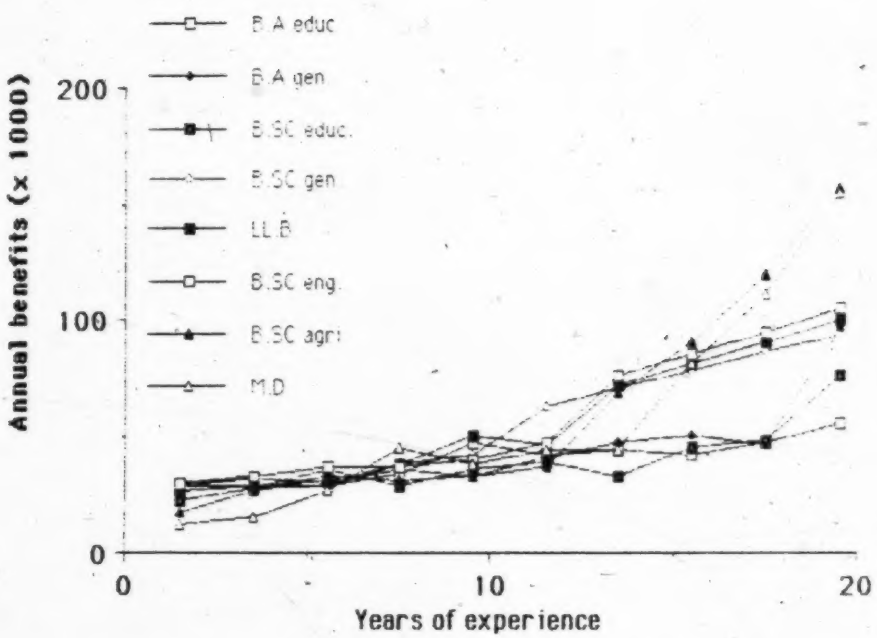


Figure 5.1 Benefits by degree course and years of experience

Discussion on Age-earnings Profiles by Degree Programs

The above findings indicated that the cross-section age-earnings profiles, unlike the experience earnings profiles, did not follow the expected traditional pattern. On the other hand, the pay-scale earnings profiles for all degree programs rose with age.

One of the reasons for this non-orthodox pattern of cross-section age earnings profiles was that the Tanzania sample contained a substantial number of mature students. It appears that the experience of mature students before obtaining a degree was not an important determinant of their earnings after graduation. Both direct entry to university from secondary schools and mature students' earnings were determined by the type of degree program studied, rather than by the background factors of experience.

The Tanzania pattern of rising age-earnings profiles by degree programs contradicted Blaug, Layard and Woodhall's (1969:172) findings that "profiles tend to rise with age to a peak and then tend to fall until the retirement age." According to Becker (1975), the shape of age-earnings profiles reflects investment in human capital. The reasons for this pattern of rising age-earnings profiles was given by Woodhall, that:

> . . . earnings in the early years of working life tend to rise steadily reflecting the fact that individuals are investing in themselves and not

> only by means of formal schooling and on the job training but also by acquiring information about the labour market by means of job search and geographical mobility. Later in their working lives these individuals reap the returns to those investments in the form of higher earnings, but as retirement approaches depreciation of skills and abilities occurs, leading to a decline in earnings. (Woodhall, 1987, p. 213)

The above observations by Woodhall would appear to explain the behaviour of pay-scale earnings in Tanzania. How do we explain the cross-section sample age-earnings (experience) relationship? An explanation was given by Micer's (1976) analysis of the effect of age on earnings. His explanation is based on acquisition of experience. He shows that:

> There is evidence to indicate that the inherent age factor affects earnings to only a minor degree during the usual working life. In data where age and work experience are statistically separable, the earnings curve is found to be mainly a function of experience rather than of age. (Micer, 1976, p. 140)

Applying the above explanation to the Tanzania data shows that the direct entry university students had a continuous history of schooling and employment after graduation: for this group, it made little difference whether age or experience was used. However, for mature students whose working lives were interrupted, information on age was not a good proxy for work experience. Since our sample contained a substantial number of mature students, experience on the job after obtaining a degree was a better predictor of earnings than age. In this case, therefore, age and work experience after obtaining a degree were

statistically separable.

The earnings profiles by degree programs tended to suggest that professional programs--in this case, medicine, engineering and law--commanded high earnings. Similar findings were indicated by Friedman and Kuznets (1945) in the case of the United States, and Stager (1970) and Blaug (1966) in the case of Britain.

How do we explain these salary earnings differentials? Did these differentials represent monopoly elements?

The above salary earnings differentials could not be judged as excessive or as monopoly earnings since in Tanzania the only restriction to entry into medicine and engineering and law is lack of the necessary ability rather than funds to finance lengthy training. One cannot assess whether a monopoly income exists or not by simply comparing earnings in different professions unless the cost of training has also been taken into account (Psacharopolous, 1973); and, since in Tanzania medicine and engineering degree programs require a longer training period than other degree programs, the extra earnings would seem to represent a compensating differential to allow for the cost of this long training period. On the other hand, since medicine and engineering are the most scarce university degree skills in Tanzania, the government and other public employers may determine earnings in the context of the

wage-competition model. Such may be the case since it appears that wage competition behaviour on the part of employers has the potential to equalize earnings within the same degree programs and establish some degree of differentiation among different degree programs depending on the demand and supply conditions related to the specific degree skills.

But these explanations do not account for the arts general and law graduates' high average earnings. In Tanzania these are not scarce skills as compared to, say, science education. In this case, probably the nature of the position occupied by the arts and law graduates determined the earnings. Most of these positions are managerial and usually managerial positions command high earnings. In fact, one of the interviewed respondents argued that:

> . . . there are clear, glaring earnings differences between those who went into administrative positions and those who are doing professional jobs. Those who control the resources get more. The answer therefore depends on where you are placed. Those managers who control our resources usually favour their jobs . . . those who are not professionals (doctors, teachers, etc.) say that we teachers did not make a wise economic choice. What they mean is that in teaching and medicine there are no opportunities to control resources!

Summary Related to Subproblem 3.0

For this part of the study the earnings and financial returns by degree programs were analyzed. Generally, the medical doctors and engineers were high on both government pay scales and cross-sectional sample earnings as reported by study respondents. Lawyers and arts graduates in the cross-sectional sample earned more than the public pay scale expectations. Experience in years after obtaining a degree appeared to be a better predictor of earnings than age.

Subproblem 4.0

What is the pattern of age-earnings profiles by gender?

The Tanzania policy papers indicate that discrimination against women's education and earnings in the modern sector of the economy has been arrested. It is significant, therefore, to investigate how the earnings of women compare with those of men. In making these comparisons, use was made of cross-sectional sample data.

The cross-sectional sample covered a total of 209 men and 90 women. On the basis of this sample, experience-earnings profiles were constructed for men and women separately. Some degree programs had few women. These programs were engineering, medicine and agriculture. These degree programs were not included in the analysis since it was thought that their exceptionally low number of females

would have distorted the results. The analyses for this subproblem, therefore, were limited to the following degree programs: arts general, arts education, science general, science education, and law.

The data on experience earnings showed the following characteristics: (a) the average starting earnings for women were lower than those for men; the average starting earnings for women were Tsh. 13,148, while those for men were Tsh. 19,573; (b) after working for twenty years the average earnings for men were Tsh. 99,512, while those for women were Tsh. 82,907; (c) at the lower levels of experience, the profiles were relatively flat in both groups; (d) the profiles were steeper in the case of women than of men, indicating that the earnings of women, although lower than those of men, rose at a faster rate than those of men.

Table 6.6 gives the t-test results comparing the overall average earnings by gender. The null hypothesis was tested, that the average earnings for male and female groups were equal. The F-ratio equaled 1.98, and the probability associated with that ratio was 0.003. Testing at the 0.05 level, we rejected the null hypothesis of equal means. It is unlikely that these two groups were drawn from populations in which mean earnings were equal.

Assuming unequal means and using the separate variance estimate, the probability associated with t-value

Table 6.6

T-Test: Comparing Average Earnings by Gender

| | N | Average Earnings | Standard Deviation | Standard Error |
|---|---|---|---|---|
| Male | 123 | 36471 | 11050 | 996.4 |
| Female | 66 | 32243 | 7861 | 967.6 |

| | | Pooled Variance Test | | | Separate Variance Test | | |
|---|---|---|---|---|---|---|---|
| F-Value | 2-Tail Prob. | T-Value | df | 2-Tail Prob. | T-Value | df | 2-Tail Prob. |
| 1.98 | .003 | 2.76 | 187 | .006 | 3.04 | 172.56 | .003 |

of 3.04 was 0.003. Testing at the 0.05 level, the null hypothesis was rejected. The differences in average earnings by gender were statistically significant. The two samples could have been drawn from populations in which the average earnings were not identical.

Table 6.6 indicates further that not only were the women's earnings less than those of men, on the average, there was less variance in their earnings as shown by the low value of the standard deviation. As a group, women's earnings were more homogeneous. Unlike that for women, the standard deviation for the men's earnings was high. This indicates that the earnings of men were more heterogenous. These results were confirmed by the values of the coefficients of variation which were found to be 0.3029 and 0.2431 for men and women respectively.

Although tentative, the above findings indicate that the Tanzania government equal opportunities act of 1978, a positive discrimination toward women, may not have achieved the ultimate goal set for it. Since earlier data were not examined in the present study, there is no way to determine whether the incomes of men and women have tended to become more alike in the period since 1978. Nevertheless, based on current data, there is reason to concur with one of the female graduates' observation that:

> . . . there is a lot of wage discrimination. Maybe I am biased, but if we take university graduates, you will never find women moving up to key positions like General Manager. These

> positions are for men. There is that element of discrimination. It is open. We have only one female judge. Women are not moving upward as fast as men. When they move up, they do not get the associated benefits as compared to men.

The above position was not shared by men. They described the situation differently. One of the male graduates described the situation of women in the labour market as follows:

> . . . there have been fewer women in professions than men. This is historical. There was unequal access to higher education. The private earnings have been high for women who went into the professions. The government initiated positive action by providing women with education. If anything, there is no discrimination; no one says a woman cannot be a lawyer or doctor . . . . There may have been original discrimination in offering education to women by families. But this may not have been perpetuated.

In fact, the whole idea of affirmative action in favour of women was challenged by some male respondents. The following comment by a male medical doctor was revealing:

> . . . under any circumstances this country is unique in providing equal opportunity to both genders. We sometimes overdo it. This makes women less competitive. They relax. We take this female gender as too weak to compete. Positive discrimination should be prevented as it makes women special. We give them what they do not deserve. Sometimes they are not worthy of high wages. This is very unchallenging to women. We are creating gender favoritism.

The coefficient of gross wage discrimination[1] as defined by Becker (1957) indicated that at the start of employment (experience = 0) the gross wage discrimination coefficient was equal to -0.3282 against women. After twenty years of work experience, gross wage discrimination against women had dropped by half to -0.1668.

Discussion of Earnings Profiles by Gender

The above results indicate that there are sex earnings differentials in Tanzania. Similar earnings differentials were found by other researchers in other countries. Corcoran and Duncan (1978) covered white workers aged 18 to 64 in the United States and found the hourly pay rate differential due to different wage structures to be 0.58. Among professional employees within a single firm in the U.S., the annual pay rate differential was 0.40 controlling for schooling, experience and field of study (Malkiel and Malkiel, 1973). Tilak's (1987) study in India found the average lifetime earnings of women to be lower than the earnings of men at every educational level, except at middle and higher professional levels of

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[1]The coefficient of gross wage discrimination $D_w$ is defined as: $D^n_{wm} = (E^n_{jm} \backslash E^m_{km}) - 1$, where $E_j$ and $E_k$ refer to the average earnings of groups j and k, m to the educational level and n to the experience group.

education. Tilak showed further that the coefficients of wage discrimination by age, educational levels and sex were positive and against women among the educated category of workers.

Several theories explain the genesis of sex earnings differentials.[2] In many instances, these theories were originally developed to explain racial and geographic earnings differentials. The problem, therefore, is to identify which theory or theories explain what has been happening in Tanzania.

Becker (1971) developed, in the neo-classical economics stance, an explanation based on taste optimization theory. Individuals and society have a wage-discrimination function. Economic agents sought to maximize this goal directed activity of wage discrimination. They also avoid certain economic transactions such as employment of some social groups--in this case women. Women are employed on the condition that their going wages are less than their contribution at the margin.

The labour market structure explanations argue that gender earnings differentials are manifestations of male

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[2]In fact, these theories can be traced back to the characteristics of perfectly competitive labour markets. These are: (a) mobility of workers between industries; (b) many employers and workers; and (c) equally productive workers (standardization).

monopoly power (Madden, 1975).[3] Men's behaviour is akin to a monopsony labour market situation. They gang together against women. For example: It is agreed that in an all-male trade union, the wage floor set does not cover women faced with a monopsonistic labour market. On the other hand, in some jobs sex segregation protects males from competition with equally productive females (Psacharopolous, 1987).

Bermann (1974) advanced the occupational crowding hypothesis of sex earnings differential. Interpreting the Tanzania findings in the crowding hypothesis sense would lead us to the conclusion that women are restricted to a relatively narrow range of degree programs and therefore to certain occupations. The value of labour services is lowered in women crowded occupations and it is raised in male dominated occupations, such as engineering, medicine and agriculture. Sex earnings differentials are a result of degree program and occupational wage differentials.

If we adopt the Cain and Aigner (1977) statistical discrimination explanation, then we can argue that Tanzanian women receive lower earnings than men because each individual woman is judged on the basis of perceived

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[3]This is akin to relaxing the second characteristic of perfect labour markets, namely that there are so many buyers of labour services (employers) and sellers (workers) that none has any market power to influence the wage rate.

group characteristics rather than on individual merit.[4] Thus, in Tanzania, there are instances in which women are offered lower earnings even though their productivity (ex-ante) is equal to that of men. If they are not offered lower earnings to start with, situations arise in some institutions where equally competent women are not promoted to top executive positions which are usually associated with high earnings and benefits. Regardless of well-stated/well-meaning government policies and legislation on wages and other labour earnings, people act on the basis of deep-rooted assumptions that differentiate between the appropriate behaviours, roles and jobs for women and men. For example, there are some subtle social expectations and assumptions such as: women must be reinforced with domestic images and goals; if women venture into paid employment they should be helpers or supporters of men; they are physically, emotionally and intellectually inferior to men; and ambitious, decisive, independent women are scorned, mocked or pitied. It would seem that such attitudes die hard or perhaps they do not die at all.

Yet Polachek (1975) advanced the view that sex earnings differentials stem mainly from sex differences in labour market skills. In this perspective, human capital

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[4]This explanation draws on some elements of the third characteristic of perfect labour markets. In this case labour is not standardized or workers are not equally productive.

investment decisions by the employers and workers themselves favour men. Several factors interact to account for male-female differences in human capital investment (Oaxaca, 1987). These factors include the unique maternal and family responsibility roles which hinder women's further training opportunities like on-the-job training, attendance at seminars, and short courses.

Some Tanzania scholars, notably Mbilinyi (1969; 1978) and Mascarenhas and Mbilinyi (1980) have given the following explanations for the labour market earnings gender differences: (a) in some areas of the country, there is still a tendency among men including the male employers to look down upon women as people who cannot work as effectively as men; (b) women harbour feelings of inferiority, e.g. they rank "boys or men as more intelligent"; (c) unequal educational opportunities at all levels of educational system; and (d) "those who manage to receive some education tend to choose areas of study which reflect the breakdown of occupations into male and female sectors."

Summary Related to Earnings and Benefits Profiles

In this part of the study the earnings and benefits profiles by degree programs and gender have been analyzed.

The differences in average earnings by gender were found to be statistically significant. On the average,

women earned lower incomes than men, particularly in the early years of employment. The earnings differences decreased as the number of years of experience increased.

# CHAPTER VII

# PRESENTATION AND DISCUSSION OF FINDINGS RELATED TO NET PRESENT VALUES AND RATES OF RETURN

## Introduction

This chapter presents and discusses the research findings related to net present values and rates of return by degree programs, gender and respondents' nature of entry into university study.

## Net Present Values

### Subproblem 5.0

What are the net present values of benefits by degree programs?

The purpose of this subproblem was to examine discounted net present values from both pay-scale earnings (benefits) and cross-sectional benefits by degree programs. The benefits were discounted at the following commonly used external rates: 5 percent, 8 percent, 10 percent , and 13 percent. The benefits were also adjusted for three values of the alpha coefficient, namely 1.00, 0.67 and 0.89. The pay scale benefits were calculated for the period 1974-1986. The cross-sectional benefits were based on graduates with 20 years of experience after obtaining a degree

(twenty year discounted benefits). The pay scale data were adjusted for inflation. Finally, the cross-sectional data were adjusted for a 0.03 growth rate as given in Tanzania economic surveys.

The Net Present Values (NPVs) by Degree Programs

Tables 7.1, 7.2 and 7.3 give the net present values calculated from unadjusted pay scales, inflation adjusted pay scales, and growth adjusted cross-sectional data, respectively.

The following picture emerged from the unadjusted pay scale net present values for r = 5.0%: First, the rank ordering of degree programs by size of NPVs was: engineering (1); medicine (2); arts general (3); arts education (4); law (5); science education and science general were tied at rank (6.5); and agriculture had rank (8). Second, the amounts of the NPVs decreased as the discount rate increased. The NPVs were higher for r = 0.05 than for the other values of the discount rates. Third, the NPVs were affected by the selected value of alpha coefficient. The NPVs increased as the value of alpha increased from 0.67 to 1.00.

Over and above the unadjusted pay scale picture, the inflation adjusted NPVs showed the following characteristics: First, they were lower than the corresponding inflation unadjusted values. Second, the

Table 7.1

Nominal Pay Scale Net Present Value of Benefits

in Tanzania Shillings

| Degree | R = 5% | | | R = 8% | | | R = 10% | | | R = 13% | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Alpha | | | Alpha | | | Alpha | | | Alpha | | |
| | 1.00 | 0.67 | 0.89 | 1.00 | 0.67 | 0.89 | 1.00 | 0.67 | 0.89 | 1.00 | 0.67 | 0.89 |
| B.A. (Ed.) | 227686 | 139911 | 198428 | 170508 | 101224 | 147413 | 140988 | 81189 | 121055 | 106077 | 57409 | 89855 |
| B.A. (Gen.) | 231771 | 142648 | 202063 | 174373 | 103813 | 150853 | 144718 | 83688 | 124375 | 109618 | 59782 | 93006 |
| B.Sc. (Ed.) | 222863 | 134408 | 193378 | 165357 | 95431 | 142049 | 135623 | 75205 | 115484 | 100395 | 51140 | 83977 |
| B.Sc. (Gen.) | 222863 | 134408 | 193378 | 165357 | 95431 | 142049 | 135623 | 75205 | 115484 | 100395 | 51140 | 83977 |
| LL.B. | 225785 | 138637 | 196736 | 168712 | 100020 | 145814 | 139257 | 80029 | 119514 | 104436 | 56309 | 88394 |
| B.Sc. (Eng.) | 269688 | 158256 | 232544 | 198959 | 109939 | 169286 | 161867 | 84447 | 136060 | 117251 | 53565 | 96022 |
| B.Sc. (Agr.) | 220026 | 130903 | 190319 | 162478 | 91919 | 138959 | 132722 | 71693 | 112379 | 97469 | 47632 | 80857 |
| M.D. | 250313 | 136130 | 212252 | 176673 | 85051 | 146132 | 137560 | 57630 | 110917 | 89780 | 23712 | 67757 |

Table 7.2

Adjusted Pay Scale Net Present Values of Benefits by Degree Programs (in Tanzania Shillings)

| Degree | R = 5% | | | R = 8% | | | R = 10% | | | R = 13% | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Alpha | | | Alpha | | | Alpha | | | Alpha | | |
| | 1.00 | 0.67 | 0.89 | 1.00 | 0.67 | 0.89 | 1.00 | 0.67 | 0.89 | 1.00 | 0.67 | 0.89 |
| B.A. (Ed.) | 31407 | 6962 | 23258 | 18813 | -1919 | 11902 | 11865 | -6874 | 5619 | 3075 | -13221 | -2356 |
| B.A. (Gen.) | 34054 | 8735 | 25615 | 21327 | -234 | 14140 | 14298 | -5244 | 7783 | 5392 | -11668 | -284 |
| B.Sc. (Ed.) | 25029 | 149 | 16736 | 12117 | -9026 | 5069 | 4959 | -14178 | -1420 | -4147 | -20822 | -9705 |
| B.Sc. (Gen.) | 25029 | 149 | 16736 | 12117 | -9026 | 5069 | 4959 | -14178 | -1420 | -4147 | -20822 | -9705 |
| LL.B. | 30182 | 6141 | 22168 | 17651 | -2697 | 10868 | 10743 | -7626 | 4620 | 2007 | -13936 | -3307 |
| B.Sc. (Eng.) | 23279 | -9641 | 12305 | 5386 | -22732 | -3986 | -4794 | -30312 | -13300 | -18101 | -40402 | -25534 |
| B.Sc. (Agr.) | 21693 | -3624 | 13254 | 8792 | -12770 | 1604 | 1644 | -17898 | -4869 | -7440 | -24501 | -13127 |
| M.D. | -4330 | -39035 | -15898 | -25474 | -55285 | -35411 | -37934 | -65089 | -46985 | -54839 | -78700 | -62792 |

Table 7.3

Cross-section Net Present Values of Benefits by Degree Programs

(Adjusted for 0.03 Growth Rate)

| Degree | R = 5% | | | R = 8% | | | R = 10% | | | R = 13% | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Alpha | | | Alpha | | | Alpha | | | Alpha | | |
| | 1.00 | 0.67 | 0.89 | 1.00 | 0.67 | 0.89 | 1.00 | 0.67 | 0.89 | 1.00 | 0.67 | 0.89 |
| B.A. (Ed.) | 313840 | 197324 | 275001 | 259319 | 160404 | 226347 | 229116 | 139904 | 199379 | 191059 | 114004 | 165374 |
| B.A. (Gen.) | 338494 | 210525 | 295837 | 275092 | 167571 | 239252 | 240296 | 143935 | 208175 | 196825 | 114319 | 169323 |
| B.Sc. (Ed.) | 301931 | 187255 | 263706 | 245720 | 149146 | 213529 | 214789 | 128119 | 185899 | 176047 | 101700 | 151264 |
| B.Sc. (Gen.) | 442587 | 280554 | 388576 | 359327 | 224296 | 314316 | 313730 | 193427 | 273629 | 256935 | 154886 | 222918 |
| LL.B. | 447589 | 284010 | 393062 | 362982 | 226854 | 317606 | 316709 | 195533 | 276317 | 259140 | 156477 | 224919 |
| B.Sc. (Eng.) | 442615 | 272942 | 386057 | 353388 | 212093 | 306289 | 304351 | 178503 | 262402 | 242978 | 136246 | 207400 |
| B.Sc. (Agr.) | 486344 | 311213 | 427967 | 388255 | 245059 | 340523 | 335252 | 209252 | 293252 | 270086 | 165143 | 235105 |
| M.D. | 431567 | 268014 | 377050 | 336394 | 202946 | 291911 | 284503 | 167268 | 245425 | 219996 | 122615 | 187536 |

overall rank ordering of degree programs by amount of NPVs changed appreciably to: arts general (1); arts education (2); law (3); science education and science general (4.5); science engineering (6); agriculture (7); and medicine (8).

The NPVs from cross-sectional sample data shown in Table 7.3 have the following characteristics: First, the rank ordering of degree programs by size of cross-section NPVs was: agriculture (1); law (2); engineering (3); science general (4); medicine (5); arts general (6); arts education (7); and science education (8). Second, the cross-sectional NPVs were also affected by the chosen discount rate and the values of the alpha coefficient. The cross-section NPVs increased as the alpha coefficient increased, and decreased as the discount rate increased.

Table 7.4 gives the degree program rank ordering by size of net present values calculated from unadjusted pay scale earnings, adjusted pay scale earnings, and cross-section earnings. The table indicates that: (a) the Spearman rank order correlation coefficient between the degree program ranks by pay scale inflation adjusted NPVs and the degree program ranks by nominal pay scale NPVs was a low 0.03; (b) the rank correlation coefficient between the degree program ranks by size of nominal pay scale NPVs and rank ordering by cross-section NPV sizes was -0.208, indicating a negative low value; (c) the rank correlation coefficient between the degree program ranks by size of

Table 7.4

Degree Program Rank Ordering by Size of Net Present Values (NPVs)

| Degree Program | Rank on Pay Scale NPVs (unadjusted) (R1) | Rank on Pay Scale NPVs (adjusted) (R2) | Rank on Cross Section NPVs (R3) |
|---|---|---|---|
| B.A. (Ed.) | 4 | 2 | 7 |
| B.A. (Gen.) | 3 | 1 | 6 |
| B.Sc. (Ed.) | 6.5 | 4.5 | 8 |
| B.Sc. (Gen.) | 6.5 | 4.5 | 4 |
| LL.B. | 5 | 3 | 2 |
| B.Sc. (Eng.) | 1 | 6 | 3 |
| B.Sc. (Agr.) | 8 | 7 | 1 |
| M.D. | 2 | 8 | 5 |

Note: Spearman rank-order correlation coefficients between:

R1 and R2 = .012 with p = .489
R1 and R3 = -.168 with p = .346
R2 and R3 = -.407 with p = .158
(critical r = .643)

inflation adjusted pay scale NPVs and degree program ranks by size of cross-section NPVs was -0.420, indicating a low but negative correlation.

Both cross-sectional nominal pay scale earnings NPVs were positive for all degree programs. This meant that the private rates of return for all degree programs in this case were more than the highest 13 percent rate of interest used in discounting the benefits. If individuals had borrowed at a rate of 13 percent to finance their education, the annual benefits (future earnings) cash flows would have been high enough to allow more interest to be deducted and still repay the original private investment consisting of total private costs.

However, the above finding was not true for the case of inflation adjusted pay scale earnings data. When the alpha coefficient equaled 0.89 and discounting at a rate of 13 percent, all the degree programs inflation adjusted NPVs were negative, indicating that, in this case, the private rate of return was less than 13 percent. When the alpha coefficient was reduced to 0.67, the inflation adjusted NPVs were negative at r = 8%, indicating that the private rate of return in this case was lower than 8 percent for all degree programs. The inflation adjusted NPVs for medicine were negative at all three discounting rates, indicating a private rate of less than five percent for inflation adjusted pay scale medicine earnings.

Discussion of Findings Related to Net Present Values

Our major assumption in computing the various NPVs was that individuals could use, or do use, the present value approach to assess the future monetary benefits associated with each degree program. They later make career choices based on the NPVs evaluation. This assumption might appear far-fetched. However, there is no doubt that there was an element of truth in this idea, as indicated by observations of one law graduate who implied that, in the past, students did not think in economic terms as the numbers of graduates for every degree program were few, but now students are responding to divergences in earnings--an indication that some fields are saturated. Our law graduate observed that:

> I did not choose to be a lawyer. I never indicated law on the career forms we were given. But since I did not do well in mathematics, I could not join commerce which was my first choice. My decision was not economic. The choice at that time was based on interest. We were not reasoning from economic choices. Every profession or degree course was scarce. The salaries were almost the same. I thought the Government would buy me over to serve it permanently. Now most people are looking at the benefits. You have to get the scarce skills.

Our cross-section NPVs indicated that the science related degree programs and law ranked high on cross-section benefits NPVs. This finding was also supported by Stager (1970) who assumed a 100 percent alpha coefficient

and found the following rankings by size of private NPVs: (a) medicine ($69,100); (b) law ($42,800); (c) arts and science ($28,600); (d) engineering ($25,000); (e) agriculture ($16,900); and (f) education ($11,100). Carol and Parry (1968) used 1960 U.S. census data and computed net present values in 67 occupations. Using a five percent discount rate, they estimated what each occupation is worth over the individual's life time after deduction of costs. Their results indicated the following NPVs in rank order: (a) dentists ($109,070); (b) physicians and surgeons ($94,448); (c) lawyers and judges ($85,984); (d) electrical engineers ($79,586); and (e) secondary school teachers ($64,477).

In our case, degree programs which had lower earnings forgone during education years and lower private direct costs, relative to other degree programs, had higher NPVs. Such degree programs were law, agriculture and science general. For these degree programs, at any discount rate, therefore, the NPVs from cross-sectional data were higher as a result of low earnings foregone and low private direct costs.

The cross-sectional NPVs for medicine and engineering were higher relative to other degree programs. Unlike law and agriculture, these degree programs had higher total private costs. However, they had higher earnings after graduation, which worked in the direction of

higher NPVs. At any discount rate the cross-sectional NPVs were higher for medicine and engineering.

The high cross-sectional and pay-scale unadjusted NPVs for medicine and engineering appeared to confirm the argument that the price of a skill (degree program) varies directly with the cost of acquiring it. Engineering and medicine had higher total private costs (mainly because of high opportunity costs) than other degree programs. However, this conclusion needs to be qualified in light of the low and negative inflation adjusted pay scale NPVs for medicine and engineering.

The NPVs for agriculture degree programs were rather surprising. The cross-sectional NPVs gave agriculture a rank of 1, with NPV of Tsh 235,105 (at $\alpha$ = 0.89, r = 13%). But the pay scale unadjusted NPVs gave agriculture the last but one rank, with NPV of Tsh. 190,319 ($\alpha$ = 0.89, r = 13%). This result would appear to suggest that the government pay scales underestimate the scarcity of agriculture graduates by offering them a lower starting salary relative to other degree programs. However, in the labour market, as shown by cross-sectional data, agriculture graduates' earnings were higher than the government expectations, thus the high NPVs.

In the case of arts education degree programs, the trend was a bit toward the opposite of that for agriculture. The government pay scale unadjusted NPVs

ranked the arts teachers fourth. But the cross-sectional earnings NPVs ranked the arts teachers seventh. In this case, the arts education graduates were worse off than the government expectations.

The above discussion brings us to a number of conclusions. First, perhaps the earnings in Tanzania were not really administered prices; and therefore, a shortage of particular degree program skills, such as agriculture, does lead to higher earnings for that degree program qualification. Second, if excess supply led to a decline in salary earnings, then the arts education degree program --unlike medicine and engineering--had become a mass profession at least for the period 1973-1986.

Finally, we wish to draw some conclusions from the inflation adjusted pay scale NPVs. The inflation pay scale adjusted NPVs were very low and, in most cases, negative at $\alpha = 0.89$, and $r = 13\%$. Degree programs with longer training periods, in this case medicine and engineering, were worse off than others. The effect of a high inflation rate was to lower the real earnings after graduation. At any rate of discount, the inflation adjusted NPVs were lower than the corresponding inflation unadjusted or cross-section pay scale NPVs. In actual fact, inflation lowered the values of private returns.

Summary of Findings Related to Subproblem 5.0

This part of the study has given the net present values of the benefits for eight degree programs. It was shown that degree programs with low opportunity costs during the training years relative to other degree programs had high NPVs of benefits. These degree programs were law, agriculture and science general. The high earnings benefits for medicine and engineering were offset by their high opportunity costs thereby resulting in low NPVs.

Subproblem 6.0

What are the NPVs by gender and nature of entry into university?

The NPVs by gender and nature of entry into university degree programs were computed for cross-sectional earnings data only. The pay scale data could not be categorized into male and female or mature student and direct student categories.

Net Present Values by Gender and Nature of Entry

The NPVs shown in Table 7.5 indicate that the NPVs for women were higher than those for men at all values of discount rate. At alpha coefficient = 0.89, men had the following NPVs: Tsh. 270,027 (r = 5%), Tsh. 218,204 (r = 8%), Tsh. 189,192 (r = 10%), and Tsh. 152,316 (r = 13%). Denison's 0.67 alpha coefficient gave the following NPVs for men: Tsh. 191,233 (r = 5%), Tsh. 151,367 (r = 8%),

Table 7.5

Cross-section Net Present Value of Benefits by Gender and Nature of Entry* into the University

| | R = 5% | | | R = 8% | | | R = 10% | | | R = 13% | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Alpha | | | Alpha | | | Alpha | | | Alpha | | |
| | 1.00 | 0.67 | 0.89 | 1.00 | 0.67 | 0.89 | 1.00 | 0.67 | 0.89 | 1.00 | 0.67 | 0.89 |
| Gender | | | | | | | | | | | | |
| Males | 309694 | 191233 | 270207 | 251623 | 151367 | 218204 | 219272 | 129032 | 189192 | 178221 | 100507 | 152316 |
| Females | 319658 | 198724 | 279346 | 259103 | 157240 | 225149 | 225666 | 134210 | 195181 | 183582 | 105041 | 157402 |
| Nature of Entry* | | | | | | | | | | | | |
| Direct | 292315 | 175653 | 253428 | 234259 | 135217 | 201245 | 201599 | 112258 | 171819 | 159670 | 82471 | 133937 |
| Mature | 433161 | 265910 | 377410 | 338758 | 200870 | 292796 | 286969 | 164921 | 246286 | 222121 | 119508 | 187917 |

* "Direct" entry students joined the University directly from high school (form six); have no work experience.
"Mature" entry students joined the University to obtain a degree after working for some years. They have to pass special examinations or obtain direct equivalent qualifications.

Tsh. 129,032 (r = 10%), and Tsh. 100,507 (r = 13%). The respective NPVs for women are: Tsh. 198,724 (r = 5%), Tsh. 157,240 (r = 8%), Tsh. 134,210 (r = 10%), and Tsh. 105,041 (r = 13%).

Table 7.5 indicates further that the NPVs for mature students were higher than those for direct students for all four values of discount rate. At alpha coefficient = 0.89, mature students had the following NPVs: Tsh. 337,410 (r = 5%), Tsh. 292,796 (r = 8%), Tsh. 246,286 (r = 10%), and Tsh. 187,917 (r = 13%). The corresponding NPVs for direct students were: Tsh. 253,428 (r = 5%), Tsh. 201,245 (r = 8%), Tsh. 171,819 (r = 10%), and Tsh. 133,937 (r = 13%). When the alpha coefficient was reduced to 0.67, the NPVs for mature students were reduced to the following values: Tsh. 265,910 (r = 5%), Tsh. 200,870 (r = 8%), Tsh. 164,921 (r = 10%), and Tsh. 119,508 (r = 13%). The respective NPVs for direct students were: Tsh. 175,653 (r = 5%), Tsh. 135,217 (r = 8%), Tsh. 112,258 (r = 10%), and Tsh. 82,471 (r = 13%).

Discussion on NPVs by Gender and Nature of Entry into University

The above findings indicate that the average NPVs for women were higher than those for men. These results tend to contradict what was demonstrated earlier, that women earned less than men. However, the two are not necessarily related. It does not necessarily follow, just

because women's earnings are below those of men, that the average NPVs will show similar trends. This is because the average NPVs are calculated by adding to the discounted differential earnings between university graduates' earnings and the lowest educational level earnings the discounted present values of direct and opportunity costs.

Tilak's (1987) study also showed that the average unadjusted NPVs to education for all the different levels and the unadjusted marginal NPVs to general degree education for women exceed those of men. His primary explanation was that women's education costs were less than those of men. Becker (1964) was also of the view that the NPVs for women might be higher than those for men because both direct and opportunity costs are usually much lower for women than for men.

The NPVs for mature students appeared to be higher than those for direct students. This finding is rather surprising because mature students had high total private cost present values. It was anticipated that the high total cost present values would reduce the net discounted benefits. However, this was not the case, because mature graduates had high earnings after four years of work experience. Their earnings rose faster than those of direct entry students. Therefore, the high earnings worked to increase the NPVs. Thus, at all four rates of discount,

the NPVs for mature students were higher than those for direct entry students.

Summary of Findings Related to Net Present Values

In this section of the study, the net present values of benefits by gender and nature of entry into university were presented. The NPVs for women and for mature students were higher than those for men and for direct entry students respectively. There were different reasons for this pattern. Women's total private costs were slightly higher than those of men. Mature students had high earnings (benefits) in the distant future as compared to direct entry students.

Subproblem 7.0

What are the private internal rates of return by degree program, gender and nature of entry into university?

Average private internal rates of return were calculated using cross-sectional earnings data inflation unadjusted and inflation adjusted pay scale earnings. The cross-section average private rates were adjusted for a 0.03 growth rate given in the Tanzania economic surveys. Private rates of return were computed by degree programs for all eight degree programs.

Private rates of return by gender and nature of entry into university were computed from aggregated degree

program earnings. Degree programs with few female responses were taken out of the computations. These degree programs are: medicine, engineering and agriculture. Therefore, the findings on private rates by gender apply to the following degree programs: arts education, arts general, science education, science general and law.

Private Internal Rates of Return by Degree Programs

Table 7.6 gives the private rates of return by degree program using cross-sectional data. When the alpha coefficient chosen was equal to 0.89, the rank ordering of the degree programs by magnitude of the private rates of return was as follows: (1) arts education (51.37%); (2) law (48.70%); (3) science general (48.62%); (4) agriculture (47.31%); (5) arts general (45.16%); (6) science education (44.35%); (7) engineering (35.64%), and (8) medicine (30.70%). These degree program rankings based on the private returns were not affected by size of discount rate. However, a low value for the alpha coefficient (i.e. 0.67) reduced private rates of return.

Table 7.7 gives the private rates of return computed from nominal pay scale earnings data by degree program. The rank ordering of the degree programs by size of private rates of return at alpha = 0.89 was as follows: (1) agriculture (33.32%); (2) arts education (32.30%); (3) law (31.81%); (4.5) Science education and science general

Table 7.6

Average Private Internal Rates of Return by Degree Programs from Cross-section Data Adjusted for 0.03 Growth Rate

| Degree | Alpha=1.00 | Alpha=0.67 | Alpha=0.89 |
|---|---|---|---|
| B.A. (Ed.) | 55.33 | 42.54 | 51.37 |
| B.A. (Gen.) | 48.77 | 37.15 | 45.16 |
| B.Sc. (Ed.) | 47.87 | 36.50 | 44.35 |
| B.Sc. (Gen.) | 52.12 | 40.82 | 48.62 |
| LL.B. | 52.17 | 40.93 | 48.70 |
| B.Sc. (Eng.) | 38.19 | 29.82 | 35.64 |
| B.Sc. (Agr.) | 50.43 | 40.30 | 47.31 |
| M.D. | 32.59 | 26.28 | 30.70 |

Table 7.7

Average Private Internal Rates of Return by Degree Programs

Calculated from Unadjusted Pay Scales Data

| Degree | Alpha=1.00 | Alpha=0.67 | Alpha=0.89 |
|---|---|---|---|
| B.A. (Ed.) | 34.86 | 26.64 | 32.30 |
| B.A. (Gen.) | 36.00 | 27.41 | 33.32 |
| B.Sc. (Ed.) | 31.73 | 23.98 | 29.32 |
| B.Sc. (Gen.) | 31.73 | 23.98 | 29.32 |
| LL.B. | 34.34 | 26.29 | 31.84 |
| B.Sc. (Eng.) | 27.50 | 20.71 | 25.42 |
| B.Sc. (Agr.) | 30.70 | 22.89 | 28.27 |
| M.D. | 21.29 | 15.55 | 19.54 |

(29.32%); (6) agriculture (28.27%); (7) engineering (25.42%); and (8) medicine (19.54%). These degree programs rankings by size of nominal pay scale earnings private returns were not affected by change in the value of alpha coefficient. However, the magnitude of the returns understandably, was affected. The effect of adjusting the pay scale earnings for inflation is shown in Table 7.8. The inflation adjustment yielded low private rates of return.

As for any degree program, treated as an investment, the rate of return is the discount rate that sets the net present value of the net stream of benefits equal to zero; the discount rate that breaks even the costs and the benefits. The length of time to reach the break even point is also related to the return rate used. The higher the rate of return, the shorter the pay back period.

Individual graduates' future decision calculus appeared to be related to the above efficiency indicators. For example, the medical degree showed low private returns. This finding for medical degree programs appeared to be supported by one medical doctor who told us that:

> . . . I feel worse off. I made a bad economic decision to do a medicine degree. I took long to get my first degree and yet earn as much or less than those who took short-cuts (sic). It has taken me twelve years of dedicated service to get this salary. My friend who did a B.A. degree took only six years to get this much.

Table 7.8

Average Private Internal Rates of Return by Degree Programs

Calculated from Inflations Adjusted Pay Scales (Base Year 1973)

| Degree | Alpha=1.00 | Alpha=0.67 | Alpha=0.89 |
|---|---|---|---|
| B.A. (Ed.) | 14.21 | 7.30 | 12.06 |
| B.A. (Gen.) | 15.14 | 7.92 | 12.88 |
| B.Sc. (Ed.) | 11.57 | 5.05 | 9.54 |
| B.Sc. (Gen.) | 11.57 | 5.05 | 9.54 |
| LL.B. | 13.78 | 7.02 | 11.68 |
| B.Sc. (Eng.) | 9.03 | 3.11 | 7.22 |
| B.Sc. (Agr.) | 10.51 | 3.98 | 8.48 |
| M.D. | 4.45 | negative | 2.88 |

Yet the flexibility of some degree qualifications and the high monetary rewards associated with different positions within the same profession were recognized by some respondents. One of the law graduates correctly observed that:

> . . . the law degree is a professional qualification. As a legal officer of my company I feel that I made a wise economic choice. I can switch to other jobs easily. This freedom of choice is not there with degrees like medicine. Some professions pay in the long run. But also in law it depends where you are employed. Those who went to the bench do not get high monetary benefits in the short run. It is a bit tricky you know!

Private Internal Rates of Return
by Gender and Nature of Entry

Table 7.9 gives the private rates of return by gender and nature of entry into university. The female average rates were higher than the rates for men at all values of the alpha coefficient. The female rates of return were: 40.91, 38.17 and 31.93 at alpha equal to 1.00, 0.89 and 0.67 respectively. On the average, the female rates were between 1.3 and 1.7 percentage points above the rates for males.

The average private rates for graduates who entered the university degree programs directly from high school were as follows: 31.77 ($\alpha$ = 1.00), 29.60 ($\alpha$ = 0.89) and 24.59 ($\alpha$ = 0.67). The average internal rates of return for respondents who entered the university degree programs from

Table 7.9

Average Private Internal Rates of Return by Gender and Nature of Entry* into University from Cross-section Data Adjusted for Growth Rate (0.03)

| Group[1] | Alpha=1.00 | Alpha=0.67 | Alpha=0.89 |
|---|---|---|---|
| Gender | | | |
| Males | 39.23 | 30.63 | 36.61 |
| Females | 40.91 | 31.93 | 38.17 |
| Nature of Entry* | | | |
| Direct | 31.77 | 24.59 | 29.60 |
| Mature | 31.45 | 24.92 | 29.48 |

* "Direct" entry students joined the University directly from high school (form six)and had no work experience prior to graduation from University.
"Mature" entry students joined the University to obtain a degree after working for some years. They have to pass special examinations or obtain direct equivalent qualifications.

work places by means of the mature students route were as follows: 31.45 ($\alpha$ = 1.00), 29.48 ($\alpha$ = 0.89) and 24.92 ($\alpha$ = 0.67). the private rates for direct graduates were slightly higher than those of mature graduates at alpha = 1.00 and 0.89. However, when the value of alpha was reduced to 0.67, the rate of return for direct graduates was slightly lower than that of mature students. Therefore, the rates of return crossed over as the value of alpha coefficient increased from 0.67 to 1.00.

Discussion on Private Returns

At a general level, both our cross-sectional and nominal pay scale earnings data give high private rates of return to university first degree programs in Tanzania. Our rate of return values appear to be higher than those given by Ziderman and Morris (1973) in the case of Britain. They estimated a private return rate of 22.5 percent. The estimate of Blaug, Layard and Woodhall (1969) in the case of India was an average of 27 percent for a professional degree.

However, our rates are comparable to those given by Psacharopoulos' (1985) survey of selected less industrialized countries. His African survey gave the following private rate of return values by country: Botswana (37.0%), Kenya (31.0%), Lesotho (31.0%), Morocco (46.6%), Nigeria (34.0%), and Somalia (33.2%).

Some reasons can be advanced for the high private rates of return. The first explanation is related to the cost variable of the cost benefit analysis equation. University education in Tanzania is highly subsidized by the government; therefore, the private expenditures on university schooling are very low when compared to the future nominal earnings. The second explanation is related to the demand for skilled labour on one hand, and labour income distribution in the general economy on the other hand. University level graduates are scarce in Tanzania and, therefore, those who have this level of education command higher earnings relative to those who have completed only the lower school levels, especially the minimum wage level on which the computation of average rates is based.

The private internal rates of return by degree programs gave an interesting picture when compared with findings from other studies. Stager's (1970) study on Ontario, Canada, gave the following degree program specialization ranking when ordered by private return rates: (1) dentistry (30.2%), (2) commerce and arts (19.0%), (3) medicine (18.0%), (4) science (17.4%), (5) engineering (16.8%), (6) agriculture (16.0%), and (7) education (10.3%). A less disaggregated study done in Britain by Morris (1973) gave the following incremental private rates of return for university degree ma[illegible]: (1)

all subjects (12.0%), (2) arts (13.5%), (3) social sciences (13.0%), (4) technology (11.5%), and (5) science (11.0%).

Psacharopoulos' (1985) survey reports the following higher education rates of return by selected country and subjects: Colombia - (1) medicine (35.6%), (2) engineering (33.7%), (3) economics (32.7%), (4) law (28.3%), and (5) agronomy (22.3%); Iran - (1) engineering (30.7%), (2) agriculture (27.4%), (3) economics (23.9%), and (4) humanities (20.0%); Brazil - (1) law (17.4%), (2) engineering (17.3%), (3) economics (16.1%), (4) medicine (11.9%), and (5) agriculture (5.2%); and the Philippines- (1) law (18.0%), (2) engineering (15.0%), (3) economics (14.0%), and (4) agriculture (5.0%).

Comparing and contrasting the Tanzania findings with the above research results gives the following picture: First, like some of the above studies undertaken in different countries, law and the arts degree programs showed high rates of return; second, unlike most of the studies of the highly industrialized countries (such as the United States), engineering and medicine degree programs had low rates of return; and third, contrary to Tanzania public opinion and suggestions by the highly industrialized studies, the sizes of rates of return for an education degree are high in Tanzania.

These are some of the explanations for the above findings. The high private rates of return for law can be

explained by the fact that the law degree was traditionally an exclusive profession. The local institutional capacity to train lawyers is still low although it was the first degree program to be offered at the University of Dar-es-Salaam. Unlike the case for other degree programs, few Tanzanian lawyers are trained overseas. Demand for the law degree is high. Yet lawyers and arts general degree graduates have a tremendous freedom of employment choice in the lucrative administrative and managerial positions. These positions command high earnings just a few years after obtaining a degree.

The medicine and engineering degree programs involve long training and the total private costs are inflated by the high opportunity costs associated with these degree programs. The starting earnings are comparable with other degree programs; however, as observed by one responding medical doctor, the high earnings occur in the distant future. These distant future earnings were heavily discounted by comparison with the opportunity costs and the low but otherwise early earnings. The combination of high total private costs, low early earnings and high distant future earnings gives a low private rate of return.

It was shown that private rates of return for women were higher than those for men. Similar findings are shown in Table 7.10 as compiled by Psacharopoulos (1975, p. 602). Rates of return for women are higher than those for men in

Table 7.10

Returns to University Education by Gender and Country

| Country | Year | Men (%) | Women (%) |
|---|---|---|---|
| Australia | 1976 | 21.1 | 21.2 |
| Austria | 1981 | 10.3 | 13.5 |
| France | 1976 | 20.0 | 12.7 |
| Britain | 1971 | 8.0 | 12.0 |
| Japan | 1980 | 5.7 | 5.8 |
| South Korea | 1971 | 15.7 | 22.9 |
| Puerto Rico | 1959 | 21.9 | 9.0 |

Source: Psacharopoulos (1975, p. 602).

Australia, Austria, Britain, Japan, South Korea and Puerto-Rico. The average earnings for women in Tanzania are lower than those for men. A casual observer, therefore, might be misled to believe that the rates of return for women would also be lower than those for men--this is not necessarily true. The average rates of return as calculated depend upon the earnings differential between university educated and less than university educated women's minimum wages, rather than by their absolute earnings. The private rates of return compare costs and benefits; the opportunity costs are lower for women than for men thus pulling down the total costs.

It is, however, revealing that work experience before obtaining a degree was not rewarded accordingly in Tanzania. Private rates of return were lower for mature (proxy for work experience) graduates than those of direct (proxy for no work experience) graduates. Certainly there should be something wrong with the procedure of determining earnings in the Tanzania economy if inexperienced human capital commands higher earnings than its experienced counterpart.

## Summary of Findings Related to Subproblem 7.0

The purpose of this section of the study was to identify the private internal rates of return by gender and nature of entry into university (proxy for work experience)

for the eight degree programs. The following degree programs showed high private rates: law, arts general, arts education and science general. The following degree programs showed low relative private rates of return: medicine and engineering. Agriculture and science education had moderate relative private rates. The private rate of return for women was shown to be higher than that for men. Work experience before joining the university did not appear to raise the private rates of return.

# CHAPTER VIII

# SUMMARY, CONCLUSIONS AND IMPLICATIONS

This chapter provides a summary of the study, by reviewing the purpose, the surveyed literature, the study design, the analyses and the findings. Conclusions are drawn from the findings. Lastly, the chapter closes by giving the implications of the study for theory, further research and educational practice in Tanzania.

## Summary

### Purpose of the Study

The major purpose of the study was to determine the private costs, private benefits, net present values of benefits and private average returns to investment in selected undergraduate degree programs offered by the University of Dar-es-Salaam. For purposes of analysis, the data were compared for eight degree programs by gender and by pre-university entry work experience.

Literature Review

The human capital perspective guided the surveyed literature. The survey provided evidence that university schooling or education in general can be considered a form of investment by the individual and by society in general. The survey indicated further that: (a) schooling or education contributes to increases in productivity and to individual monetary benefits; (b) private returns differ by fields of study; (c) private demand for specific degree programs results, among other things, in changing relative discounted lifetime incomes in the relevant alternative fields; and (d) the rate of return is a relative concept and, therefore, sometimes the private rates return for women may be higher than those for men, although the survey indicated that women in most countries earn on the average less than men.

The critiques of the human capital perspective were also reviewed. These included the following: (a) that there are sociological and psychological explanations for the value of schooling or education; (b) that existing labour markets are segmented and imperfect; and (c) that the Marxian-conflict perspective is not in keeping with the human capital perspective in explaining differences in income.

Research Design

The cross-sectional part of the study used data on earnings and private costs as given by a sample of respondents. At some stages in the study the cross-sectional sample data were compared with government pay scales and statistics, and with the comments made during interviews.

The variables of the study were of three types. Basic descriptive variables were as follows: age, sex, age at start of degree program, type of degree program, and employment before enrolment in a degree program as an indication of work experience. Private cost variables were as follows: opportunity costs (indirect costs) and direct private expenditures (direct costs). Lastly, private benefits were represented by the annual net salary earnings.

For purposes of comparison, the following eight degree programs were studied: (a) arts education; (b) arts general; (c) law; (d) science education; (e) science general; (f) engineering; (g) agriculture; and (h) medicine. Comparisons were made in terms of gender and pre-university study work experience.

Essentially, the analysis involved an economic comparison of private costs and private benefits. The following indicators of performance of university education were used: (a) rankings of earnings and private costs by

degree programs, by gender and by pre-university experience; (b) differential earnings and private costs by degree programs and by gender; and (c) the net present values and private rates of return by degree program, by gender and by pre-university work experience.

## Analysis and Findings

The analysis addressed the sub-problems. Below is a summary of the findings for each sub-problem.

### Sub-problem 1.0

How do the direct private costs and indirect private costs compare across the various degree programs?

#### Direct Private Costs

1. Government estimates provided the following degree program rank order by amounts of direct private costs: medicine (1); engineering (2); science education (3.5); science general (3.5); arts education (5.5); arts general (5.5); law (7); and agriculture (8).
2. Data from the cross-sectional sample gave the following degree program rank ordering by amounts of direct private costs: law (1); arts general (2); engineering (3); arts education (4); agriculture (5); science general (6); science education (7); and medicine (8).

3. A one-way analysis of variance (ANOVA) indicated that the difference in mean direct private costs by degree programs were not statistically significant at p = 0.05.

Indirect Private Costs

1. Government estimates provided the following rank order for the various degree programs when they were arranged by magnitude of indirect private costs: medicine (1); engineering (2); agriculture (3); science education (4.5); science general (4.5); arts education (6.5); arts general (6.5); and law (8).
2. Data from the cross-sectional sample resulted in the following degree program rank order in terms of magnitude of the indirect costs: engineering (1); medicine (2); agriculture (3); science general (4); law (5); art general (6); science education (7); and arts education (8).
3. The differences between the average amounts of indirect costs by degree programs were statistically significant at p = 0.05.
4. The degree program pairs which had statistically significantly different amounts of average indirect costs were the following: (a) engineering and arts education; (b) medicine and arts education; and (c) engineering and science education.

Direct Private Costs vis-a-vis Indirect Private Costs

1. According to government statistics, the degree programs with high (low) direct private costs were the same degree programs with high (low) indirect private costs.
2. According to cross-sectional sample respondents, the degree programs which had high (low) direct private costs were not necessarily the same degree programs which had high (low) indirect private costs.
3. The amounts of the direct private costs by degree programs were consistently smaller than the corresponding indirect private costs.
4. While the differences in the average direct private expenditures by degree program could be ignored on statistical grounds, the differences in average indirect private costs for these programs were real and thus could not be ignored.

Total Private costs

1. The government data indicated the following rank order based on the total private costs for each of the degree programs: medicine (1); engineering (2); agriculture (3); science general (4.5); science education (4.5); arts education (6); arts general (7.5); and law (7.5).
2. Data from the cross-sectional sample resulted in the following rank order based on the total private costs:

engineering (1); medicine (2); agriculture (3); law (4); arts general (5); science general (6); science education (7); and arts education (8).

3. Degree programs ranked high (low) on total private costs as determined from government statistics were also found to rank high (low) on total private costs as given by respondents' cross-sectional study.

Sub-problem 2.0

How do the amounts of the direct private costs and indirect private costs compare by gender and nature of entry into university?

Private Costs by Gender and Nature of Entry

1. The differences in average direct private costs incurred by male and by female respondents were not statistically significant at $p = 0.05$.
2. The differences in average indirect costs incurred by male and by female respondents were not statistically significant at $p = 0.05$.
3. The differences in average direct private costs incurred by respondents who had work experience before joining university studies and by respondents who had no such work experience were not statistically significant.
4. The differences in average indirect costs incurred by respondents who had work experience before engaging in

university study and those who had no work experience before becoming university students were not statistically significant.

Sub-problem 3.0

What is the pattern of age (experience) earnings profiles by degree programs?

Age (Experience) Earnings Profiles by Degree Program

1. The professional degree programs, namely medicine, engineering and law, ranked highest on annual earnings a reported by the respondents in the cross-sectional study.
2. The law and arts general graduates in the cross-sectional sample had higher earnings than those outlined in the government pay scale expectations.
3. The government pay scale earnings profiles appeared to rise more rapidly than the cross-sectional sample earnings.
4. The relationship between experience and annual earnings appeared to be positive and stronger than that between age and annual earnings.
5. Initially, the experience-earnings profiles for all eight degree programs appeared to be similar, but as the number of years of work experience after obtaining a degree increased, the profiles for medicine,

agriculture, engineering and law showed a more rapid rise in incomes for graduates of these four programs.

Sub-problem 4.0

What is the pattern of age-earnings profiles by gender?

Age-earnings Profiles by Gender

1. The initial average earnings for women were lower than the initial average earnings for men.
2. The profiles were steeper in the case of women than of men, an indication that the earnings for women, although lower than those of men, rose at a faster rate than did the men's.
3. The women's average earnings were lower than those of men. As a group, women were more homogeneous in average earnings. Unlike women, the men's average earnings varied widely, an indication that as a group the earnings of men were quite heterogeneous.
4. The differences in average earnings by gender were statistically significant at $p = 0.05$.

Sub-problem 5.0

What are the net present values of benefits by degree program?

Net Present Values by Degree program

1. The rank ordering of degree program according to the magnitude of the cross-sectional respondents' adjusted NPVs was as follows: agriculture (1); law (2); engineering (3); science general (4); medicine (5); arts general (6); arts education (7); and science education (8).
2. The rank ordering of degree programs by decreasing magnitude of the nominal (real) pay scale NPVs was as follows: engineering (1); medicine (2); arts general (3); arts education (4); law (5); science education (6.5); science general (6.5); and agriculture (8).
3. The Spearman rank order correlation coefficient between the degree programs ranked according to the cross-sectional study respondents' NPVs and according to the nominal pay scale NPVs was -0.42.
4. The Spearman rank order correlation coefficient between the degree programs ranked by size of nominal pay scale NPVs and by size of real pay scale NPVs was 0.03.
5. The real pay scale NPVs for medicine were negative for all four discount rates, five percent, eight percent and thirteen percent.

Sub-problem 6.0

What are the NPVs by gender and by nature of entry into university?

Net Present Values by Gender and by Nature of Entry

1. The NPVs for women in the cross-sectional analyses were higher than those for men for all values of selected discount rates, five percent, eight percent, ten percent and thirteen percent.
2. Using the cross-sectional data, the NPVs for graduates who attended university after work experience were higher than those for graduates who went to university directly from school, for all four selected values of discount rates, five percent, eight percent, ten percent and thirteen percent.

Sub-problem 7.0

What are the private internal rates of return by degree program, by gender and by nature of entry into university?

Average Private Rates of Return

1. The rank ordering of the degree programs by private rates of return ($\alpha$ = 0.89) as determined from the use of the cross-sectional data was as follows: arts education (51.37% [1]); law (48.70% [2]); science general (48.62% [3]); agriculture (47.31% [4]); arts

general (45.16% [5]); science education (44.35% [6]); engineering (35.64% [7]); and medicine (30.70% [8]).

2. The rank ordering of the degree programs by amounts of private rates of return ($\alpha$ = 0.89) as determined from the use of government pay scales was as follows: arts general (33.32% [1]); arts education (32.30% [2]); law (31.81% [3]); science education and science general (29.32% [4.5]); agriculture (28.27% [6]); engineering (25.42% [7]); and medicine (19.54% [8]).
3. The real (inflation adjusted) pay scale private rates of return by degree programs were lower than the corresponding (inflation unadjusted) nominal pay scale private rates of return.
4. For the value of alpha coefficient equal to 0.67, the real pay scale private rate of return for medicine was negative.
5. The private rates of return for females were higher than the private rates of return for male graduates in the sample at all values of the alpha coefficient.
6. The private rates of return for graduates who entered the university degree programs directly from high school were higher than those of mature graduates who entered the university degree programs from work places.

## Conclusions

This section provides a number of conclusions based on the study findings.

### Private Costs

1. The direct private expenditures for those who pursued the eight degree programs were found to be low and almost equal. The major reason for this is that university schooling is highly subsidized by the central government. University students do not pay fees. They also receive a monthly maintenance allowance to cover transport costs, bedding, clothing, books and other non-tuition expenses. Degree program differences do not seem to affect direct private expenditures.
2. The differences between average indirect costs or opportunity costs among the degree programs were high and statistically significant. In fact, the opportunity costs were the major contributor to the total private costs for all eight degree programs. The sizes of these opportunity costs were determined by two factors: the time it takes to complete a degree program and the annual earnings of high school graduates (foregone earnings). Therefore, degree programs which take more years of study had high

opportunity costs. These degree programs were: medicine and engineering. On the other hand, generally, the science related degree programs had high opportunity costs because of high annual earnings given to form six science graduates.

3. The differences in average private costs by gender were not statistically significant. This finding leads to the conclusion that, in a highly subsidized higher education system such as Tanzania, not only are the private expenditures on schooling by male and female students low, but also, the variances in spending patterns for male students and female students are similar. Gender differences do not seem to explain private expenditure differences.
4. Differences in average private costs by nature of entry into university degree programs (work experience or no work experience) were not statistically significant at $p = 0.05$. Private spending patterns and indirect costs seemed not to be significantly influenced by student past work experience. Both groups of students--those with work experience and those who came to university directly from school--incurred almost equal indirect costs in the form of foregone earnings.

Age and Experience Earnings Profiles

1. A comparison of the earnings profiles by degree program leads to the following conclusions: (a) "specific" skills degree programs such as medicine, engineering, law (where, in many cases, almost all graduates who qualify go into the relevant job) showed higher average earnings (the teachers were an exception); (b) the difference in earnings between degree programs was low in the early years of experience but increased after 13 years of work experience; and (c) the earnings profiles for medicine, agriculture, law and engineering were steeper than the others with increasing years of experience and these occupations reached their peak earnings earlier.
2. The cross-sectional sample profiles appeared not to fit the usual behaviour patterns for age-earnings profiles. Number of years of work experience after obtaining a degree appeared to be a better predictor of earnings than did age of respondent. As the number of years following completion of a degree increased, so too did the size of earnings.
3. The differences in average earnings by gender were statistically significant. This finding leads to the conclusion that, on the average, women's earnings were lower than those of men. Also, the variances in male and female earnings were unequal, that of the females

being smaller. This leads to the conclusion that women's earnings are much more homogeneous, whereas the men's are quite dispersed.

Net Present Values of Benefits

1. From the rankings of degree programs by NPVs, we can conclude that: (a) the science related specific skills programs and law ranked high in terms of net present values of benefits; (b) some degree programs which ranked high (low) in terms of cross-sectional NPVs had low (high) rankings when pay scale NPVs were used, as follows: agriculture, arts general and science general; and (c) the inflation adjusted (real) NPVs were lower than the corresponding inflation unadjusted (nominal) NPVs for all degree programs.
2. The high pay scale earnings for medicine were attained in the distant future, therefore these future earnings were highly affected by the inflation correction as compared with other degree programs. As a result, the real pay scale NPVs for medicine were negative for all three discount rates used, five percent, eight percent and thirteen percent.
3. The agriculture degree program ranked highest in terms of cross-sectional NPVs; however, this degree program ranked lowest on pay scale nominal NPVs. This indicated a sharp difference between the official

government pay scale expectations and what was really taking place in the labour market. Monetary benefits associated with the agriculture degree program were higher than the government expectations, an indication that the government planners underestimate the scarcity of agriculture graduates.

4. The NPVs for teachers (arts education and science education degree programs) were consistently ranked low on both the cross-sectional NPVs and the pay scale NPVs. Unlike other degree programs, the education degree earnings tended to be low both from short and long-term perspectives, an indication that the education degree earnings were rigid and institutional and promotion prospects low as compared with other degree programs.
5. The cross-sectional NPVs for women were higher than those for men. This finding leads to the conclusion that, in general, for a nineteen year work experience, private investment in university education in Tanzania was more profitable for women than men. This is because the discounted annual monetary cash flows for women were bigger than those of men.
6. The cross-sectional NPVs for graduates who joined the university from work places were higher than were those for direct entrants. This finding leads to the conclusion that, in the long run, individual private

investment in university education was more profitable for graduates with work experience than for those who had no work experience.

Average Private Rates of Return

1. Based on the cross-sectional and nominal pay scale private rates of return for the various degree programs, the conclusion can be reached that generally, the rates of return were high for all degree programs. Private investment in university education showed high profitability. These high rates of return may also be an indication of a scarcity of degree program skills in Tanzania.
2. A comparison of the private rates by degree programs brings us to the conclusion that the period for obtaining a complete return for monetary investment is shorter for the education, law and arts general degree programs than for the science and special skills (medicine, engineering, agriculture) degree programs.
3. The effect of inflation adjustments on pay scale private rates of return was to reduce the values of these rates appreciably for all degree programs. Although the nominal pay scale rates of return appeared to be high, the magnitudes of these rates appreciably decreased when inflation was taken into consideration. Therefore with corrections for inflation taken into

consideration, the period of time for obtaining return for private investment in university schooling may increase.

4. Degree programs with high annual earnings in the distant future and to some extent high NPVs had their private rates of return decreased appreciably when the inflation adjustment was made. In this case, the medicine degree program which was highest on NPVs had negative private rates of return. Therefore, when an adjustment for inflation was made, the payback period lengthened.
5. A surprising finding was that the private rates of return for women were higher than those for men. Although women's average earnings were lower than those of men, their monetary costs and benefits flows broke even faster than those of men. In the short run, women's private investment in university schooling appeared to be more "efficient"--in the financial sense-- than investment by men. However, this generalization might not hold in the long run.
6. Secondary school graduates who entered the university degree programs directly from high school showed higher private rates of return than did the mature adults who entered university after work experience. This leads to the conclusion that the flow of private monetary returns was more rapid for direct entry graduates than

for mature entry graduates. The private costs and benefits flows break-even point was even shorter in the case of direct entry students than in the case of mature entry students.

## Implications

This section presents the implications of the study. These implications given below are under three categories: theoretical implications practical implications and further research implications.

### Theoretical Implications

1. In the literature surveyed cross-sectional earnings data were criticized for not representing accurately the year-by-year flow of earnings for individuals or groups of individuals over the course of their working lives. It was argued that cross-sectional data represent a cross-section of earnings for successive generations and/or an approximation of the expected earnings of the present generation over its future lifetime. The time series or cohort data were criticized for giving a picture of the past (ex-post analysis) and therefore are not useful for determining future or present implications.

The present study used both cross-sectional and time series (pay scale) data. The findings of this study suggest that cross-sectional data and time series data may give quite different results when calculating economic efficiency indicators. In fact, the rank order correlation coefficient between degree program rankings based on the computation of cross-sectional NPVs and rankings based on pay scale NPVs was negative. On the other hand, even by logical necessity, the inflation adjustment on pay scale data lowers the private benefits substantially. The cross-sectional data, so to speak, reproduce the supposition that there is no inflation.

2. The literature surveyed indicated an unresolved debate as to which of the two orthodox investment efficiency criteria was superior--the NPV or the rate of return. The present study implied that the choice of one criterion over the other depended on how the problem (question) is posed. If the problem posed is "to rank degree programs by size of long-run monetary payoffs," then it would be sensible to choose the NPV. If the problem is "to rank degree programs by speed or rapidity in reaching the break-even point," then the rate of return would be appropriate. A degree program appearing superior on NPV criterion may turn out to be inferior on the private rate of return criterion. This

was the case for the medicine, agriculture, and education degree programs.

3. The surveyed literature presented two competing models of wages (earnings) determination: the wage competition model and the job competition model. In the wage competition model, earnings are determined in the labour market (by supply and demand conditions). In the job competition model, earnings are determined outside the labour market and therefore relative earnings by degree programs do not indicate the benefits of education but the differences in background factors (i.e. sex, race, quality of degree, socio-economic status, etc.).

The implication of these findings is that the Tanzania economy lies somewhere on the continuum between these two extremes, but nearer the wage competition extreme. The reasons for this generalization are as follows: (a) the major determinants of the amounts of benefits of education were the relative earnings for the various degree programs because the private expenditures were low and almost the same, which is characteristic of a wage competition situation; (b) in the short run, mature graduates' work experience was found not rewarded accordingly, an indication that employers probably did not value past on-the-job training skills, contrary to

the job competition model expectations; and (c) sex as a background factor did not appear to play a significant role in relative earnings determination because the coefficient of gross wage discrimination against women was narrowing and yet the private returns for women were higher than those of men.

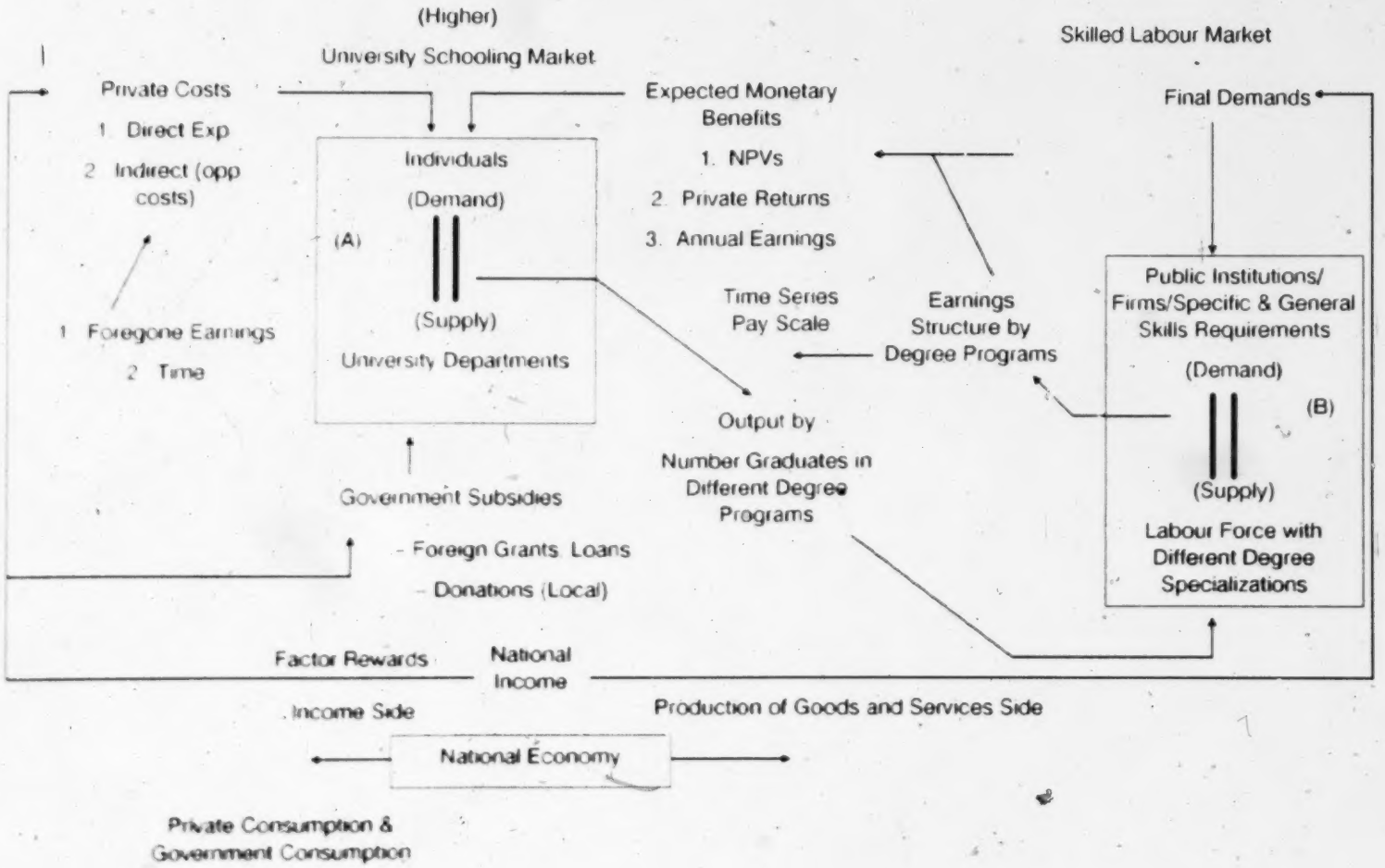
4. It was argued in the survey that the demand for different university degree programs originate from the choices of individual students in response to supply opportunities offered by government subsidized higher education institutions and labour market earnings. In the traditional literatufe the major determinant of higher education demand is usually thought to be family income and wage structure by degree programs.

Figure 8.1 gives the implications of the current study set in the form of a conceptual model. In this model (since university schooling is highly subsidized and the study found the differences in private average direct costs by degree programs to be statistically insignificant), opportunity costs and anticipated benefits account for changes in demand in the university education market, while supply in this market is a function of government financial efforts and other public subsidies.

The university schooling market (A) is related to the skilled labour market (B). In the skill labour

**Figure 8.1**

**Conceptual Model of Tanzania University Human Capital Market**



market, demand is determined by the specific and general skills needs of both government and non-government institutions. Supply in the labour market consists of the university graduates' output in the labour force.

Both the university schooling market and the skilled labour market influence each other. While the university schooling market determines the number of graduates with different degree program qualifications who enter and complete programs, the skilled labour market determines the earnings structures with the associated benefits (NPVs, private rates of return, and annual earnings).

Practical Implications

1. The findings of the study indicated that private direct expenditures on university schooling by degree programs were low; yet, the private returns to graduates of the various degree programs were high. Since university education is highly subsidized by the government, the above finding suggests that it may be possible to transfer some of the burden of financing higher education to the consumers so that the resources saved in this way could be transferred to other levels of education which are not as heavily subsidized. A scholarship or loan scheme could be used to finance

higher education. However, since there are two categories of students--those who can afford to pay for their schooling and those who cannot--loan payments can be made after getting the job. Some formulae will have to be used so that individuals in special professions which have social contributions such as medicine and teaching, pay less of the original loan.

2. The findings revealed that there were differences between government pay scale earnings and the cross-sectional sample earnings. While the government pay scales appeared to favour engineers and medical doctors, the cross-sectional data revealed that higher average earnings accrued to lawyers and arts general graduates.

The government pay scales are usually based on an assumed scarcity of certain specific skills which are then subsidized as a form of encouragement for prospective candidates who might be interested in these skills areas. This procedure may be useful if all graduates are employed in the public sector i.e. government owned hospitals, government owned schools and other public works. However, when a substantial number of graduates are employed in semi-autonomous parastatals, their earnings will tend to reflect real supply and demand conditions. If government-employed graduates are underpaid as compared to those working in

non-government organizations and as long as this situation is not checked, there may be a movement of skilled labour from government institutions to non-government ones. In a worse situation, brain drain may result.

3. The findings on differential private benefits by degree programs caution against the practice of a narrow approach to manpower planning in response to a particular prediction. Individuals behave rationally by responding to the monetary incentive signals in the labour market. Individuals' career preferences and choices may be different from what the government views as its planning needs in the various occupations. For example, the Tanzania government has consistently argued for the training of more doctors and science teachers, yet the private monetary benefits for these degree programs were found to be lower than those accruing to arts and law graduates whose skills were not considered scarce by the government. Thus government intervention can have certain unanticipated consequences. In this regard, perceived social needs should not be the dominant factors in determining work incentives. On the other hand, since Tanzania is not a closed society, loyalty to ideology cannot be sustained indefinitely. Scarce skills status and political

socialization are not always compensating factors if individuals are financially impoverished.

## Research Implications

The following research implications are put forward.

1. The size of the cross-sectional data sample was so small that, in some cases, firm conclusions could not be drawn. It would be meaningful and useful to replicate the study with a large sample consisting of a proportional representation of respondents from the eight degree programs studied.
2. The study was delimited to monetary, private, cost benefit analysis. This narrow focus underestimated the total monetary value of the related total pay package associated with degree graduates. Future Tanzanian studies in this area could broaden the focus to include the following: (a) pecuniary fringes such as life assurance, paid leave, house allowance, car allowances, subsidized meals and pensions and (b) non-pecuniary fringes such as leisure time, working conditions, job security and social status.
3. Differences between mean opportunity costs for the various degree programs were found to be high and statistically significant. Further studies are suggested to determine how the opportunity costs for the difference degree programs influence the private

decision to enrol in and create the demand for different degree programs. Are the opportunity costs the major determinant of demand for the different degree programs rather than family income?

4. Lawyers and arts graduates in the cross-sectional sample appeared to have higher average earnings than did graduates of other degree programs and than the government pay scale expectations would have predicted. In this regard, further research could answer the following questions: (a) To what degree do the earnings of lawyers and of arts graduates indicate the presence of monopoly earnings?; (b) What are the effects of the earnings of lawyers and arts graduates on income distribution, resource allocation and differential private returns?; and (c) How do the earnings of lawyers and arts graduates affect the private choice to enrol in other education and science related degree programs?

5. Meaningful findings could be obtained by studies which disaggregate the degree programs into fields of specialization. Examples of further disaggregation could be as follows: (a) engineering: electrical, mechanical, chemical and civil; (b) medicine: internal medicine, paediatrics, radiology, general surgery, obstetrics-gynecology; (c) science: chemistry, physics, zoology, botany, mathematics, computer

science; and (d) arts and social studies: economics, political science, sociology, history, languages.

6. The study suggested that degree specializations with high NPVs had low private rates of return and vice versa. Further research could be designed to answer the following questions: (a) To what degree do individuals use each of these criteria in evaluating degree program private monetary returns?; and (b) Which of the two criteria has a greater influence on individuals' career choices?

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# APPENDIX A

## RETURNS TO EDUCATION PROJECT
## GRADUATES' QUESTIONNAIRE

## APPENDIX A

### RETURNS TO EDUCATION PROJECT
### GRADUATES' QUESTIONNAIRE

For Office Use Only

1. Age: _____ years old. $V_1$ (1 - 2)

2. Sex: Please check the correct response below: $V_2$ (3)

   _____ Male

   _____ Female

3. What was your age when you first entered the university degree program? $V_3$ (4 - 5)

   _____ years old.

4. University Training - Check the relevant response below: $V_4$ (6)

   _____ B.A. (Education)

   _____ B.A. (General)

   _____ B.Sc. (Education)

   _____ B.Sc. (General)

   _____ LL.B. (Law)

   _____ B.Sc. (Engineering)

   _____ Doctor of Medicine (M.D.)

   _____ B.Sc. Agriculture

5. What was the nature of your entry into the university degree course program? Check the correct response below: $V_5$ (7)

   _____ Direct entrance (direct from high school)

   _____ Mature entrance (indirect from workplace)

6. Were you employed before joining the university degree course program? Check the correct response below: $V_6$ (8)

   _____ Yes

   _____ No

7. If you were employed before joining the university degree course program, give the actual or estimated last annual net salary earnings which you were receiving. Write the figures in Tanzanian shillings below, or check the correct response. $V_7$ (9 - 14)

_____ Tsh.

_____ Not employed

8. Most university costs are paid for by the Government, but it is possible that you incurred some extra private expenditures related to your university studies. Give the actual or estimated private expenditures which you incurred below.

_____ First year $V_8$ (16 - 19)

_____ Second year $V_9$ (20 - 23)

_____ Third year $V_{10}$ (24 - 27)

_____ Fourth year $V_{11}$ (28 - 31)

_____ Fifth year $V_{12}$ (32 - 35)

9. Usually, students are paid monthly (annual) allowances by the Government through the university. Give the actual annual allowance in Tsh. which you received from the government below.

_____ First year $V_{13}$ (36 - 39)

_____ Second year $V_{14}$ (40 - 43)

_____ Third year $V_{15}$ (44 - 47)

_____ Fourth year $V_{16}$ (48 - 51)

_____ Fifth year $V_{17}$ (52 - 55)

10. Employer: Please check the relevant response below. $V_{18}$ (56)

_____ Government

_____ Private

_____ Parastatal

11. Estimate your annual salary earnings before tax (gross) and after tax (net) which you received in each of the years 1987, 1986, and 1985. Please write the figures in Tsh. in the spaces provided below.

| Year | Gross in Tsh. | Net in Tsh. | |
|---|---|---|---|
| 1987 | _____ | _____ | $V_{19}$ (57 - 62) |
| 1986 | _____ | _____ | $V_{20}$ (63 - 38) |
| 1985 | _____ | _____ | $V_{21}$ (1 - 6) C2 |
| | | | $V_{22}$ (7 - 12) |
| | | | $V_{23}$ (13 - 18) |
| | | | $V_{24}$ (19 - 24) |

**DO NOT ANSWER THE PART BELOW**

12. What are the estimated foregone salary earnings? $V_{25}$ (25 - 30)

_____ Tsh.

13. What is the estimated minimum wage? $V_{26}$ (31 - 35)

_____ Tsh.

# APPENDIX B

## RETURNS TO EDUCATION PROJECT
## INTERVIEW QUESTIONS

# APPENDIX B

## RETURNS TO EDUCATION PROJECT
## INTERVIEW QUESTIONS

1. How do you compare the private (social) costs and the private (social) benefits or returns to investment in university education in Tanzania?

2. Usually studies have indicated that private returns are higher than social returns. Do you think this trend should be reversed in Tanzania or not? Give some reasons for your answer.

3. Compare the returns (private and social) to your university program and other programs. Do you feel better off or not? Did you make a wise economic decision? In which programs should more social investment resources go? Why?

4. Do you have any comments regarding public university education funding policies and their relationship to personal benefits (economic) and earnings inequality in Tanzania?

5. How do the private returns and benefits accruing to women compare with those of men across the different university degree programs? Are there elements of discrimination in terms of upward mobility and benefits?

# APPENDIX C

## EMPLOYER'S DATA SHEET

# APPENDIX C

## EMPLOYER'S DATA SHEET

1. Employer: Please check the relevant response below:

   _____ Government
   _____ Private
   _____ Parastatal

2. Consider a University of Dar-es-Salaam graduate who was first employed by your organization in the year 1974. Trace, on the table below, how his/her annual salary before tax (gross pay) has been changing over time to 1987.

| | B.Sc. Agr. | B.A. Gen. | B.A. Educ. | B.Sc. Gen. | B.Sc. Educ. | B.Sc. Eng. | M.D. | LL.B. |
|---|---|---|---|---|---|---|---|---|
| 1974 | | | | | | | | |
| 1975 | | | | | | | | |
| 1976 | | | | | | | | |
| 1977 | | | | | | | | |
| 1978 | | | | | | | | |
| 1979 | | | | | | | | |
| 1980 | | | | | | | | |
| 1981 | | | | | | | | |
| 1982 | | | | | | | | |
| 1983 | | | | | | | | |
| 1984 | | | | | | | | |
| 1985 | | | | | | | | |
| 1986 | | | | | | | | |
| 1987 | | | | | | | | |

# APPENDIX D

## GOVERNMENT PAY SCALE DATA ON PRIVATE COSTS, PRIVATE BENEFITS, AND THE COST OF LIVING INDEXES

Appendix D1

Pay Scale Data:

Private Costs and Benefit Flows for Bachelor of Arts with Education Graduates

in Tanzania Shillings (1971 - 1987)

| Year | Direct Private Costs | Oppor-tunity Costs | Annual Earnings Benefits | Minimum Wage | Cost of Living Index** | Adjusted Direct Private Costs* | Adjusted Oppor-tunity Costs* | Adjusted Annual Earnings Benefits* | Adjusted Minimum Wage* |
|---|---|---|---|---|---|---|---|---|---|
| 1971 | 1750 | 10500 | | | 102.9 | 2071 | 12429 | | |
| 1972 | 1500 | 10575 | | | 106.0 | 1724 | 12151 | | |
| 1973 | 1500 | 10615 | | | 121.8 | 1500 | 10615 | | |
| 1974 | | | 17700 | 4080 | 152.0 | | | 14183 | 3269 |
| 1975 | | | 18360 | 4560 | 204.0 | | | 10962 | 2723 |
| 1976 | | | 19140 | 4560 | 225.7 | | | 10329 | 2461 |
| 1977 | | | 22380 | 4560 | 252.4 | | | 10800 | 2201 |
| 1978 | | | 23460 | 4560 | 302.7 | | | 9440 | 1835 |
| 1979 | | | 24240 | 5280 | 352.8 | | | 8369 | 1823 |
| 1980 | | | 25320 | 5280 | 425.6 | | | 7246 | 1511 |
| 1981 | | | 38520 | 5280 | 487.6 | | | 9622 | 1319 |
| 1982 | | | 39840 | 6500 | 498.4 | | | 9736 | 1588 |
| 1983 | | | 41160 | 6500 | 647.3 | | | 7745 | 1223 |
| 1984 | | | 54060 | 7500 | 871.9 | | | 7552 | 1048 |
| 1985 | | | 55680 | 12500 | 927.5 | | | 7312 | 1642 |
| 1986 | | | 57300 | 12500 | 1007.2 | | | 6929 | 1512 |
| 1987 | | | 77400 | 18500 | 1337.6 | | | 7048 | 1685 |

* Data adjusted for the year 1973
** Cost of living index for base year 1969

Appendix D2

Pay Scale Data:

Private Costs and Benefit Flows for Bachelor of Arts General Graduates

in Tanzania Shillings (1971 - 1987)

| Year | Direct Private Costs | Oppor-tunity Costs | Annual Earnings Benefits | Minimum Wage | Cost of Living Index** | Adjusted Direct Private Costs* | Adjusted Oppor-tunity Costs* | Adjusted Annual Earnings Benefits* | Adjusted Minimum Wage* |
|---|---|---|---|---|---|---|---|---|---|
| 1971 | 1750 | 10500 | | | 102.9 | 2071 | 12429 | | |
| 1972 | 1500 | 10575 | | | 106.0 | 1724 | 12151 | | |
| 1973 | 1500 | 10615 | | | 121.8 | 1500 | 10615 | | |
| 1974 | | | 19140 | 4080 | 152.0 | | | 15337 | 3269 |
| 1975 | | | 19980 | 4560 | 204.0 | | | 11929 | 2723 |
| 1976 | | | 20580 | 4560 | 225.7 | | | 11106 | 2461 |
| 1977 | | | 22380 | 4560 | 252.4 | | | 10800 | 2201 |
| 1978 | | | 23460 | 4560 | 302.7 | | | 9440 | 1835 |
| 1979 | | | 24240 | 5280 | 352.8 | | | 8369 | 1823 |
| 1980 | | | 25320 | 5280 | 425.6 | | | 7246 | 1511 |
| 1981 | | | 38520 | 5280 | 487.6 | | | 9622 | 1319 |
| 1982 | | | 39840 | 6500 | 498.4 | | | 9736 | 1588 |
| 1983 | | | 41160 | 6500 | 647.3 | | | 7745 | 1223 |
| 1984 | | | 54060 | 7500 | 871.9 | | | 7552 | 1048 |
| 1985 | | | 55680 | 12500 | 927.5 | | | 7312 | 1642 |
| 1986 | | | 57300 | 12500 | 1007.2 | | | 6929 | 1512 |
| 1987 | | | 77400 | 18500 | 1337.6 | | | 7048 | 1685 |

* Data adjusted for the year 1973
** Cost of living index for base year 1969

Appendix D3

Pay Scale Data:

Private Costs and Benefit Flows for Bachelor of Science with Education Graduates

in Tanzania Shillings (1971 - 1987)

| Year | Direct Private Costs | Opportunity Costs | Annual Earnings Benefits | Minimum Wage | Cost of Living Index** | Adjusted Direct Private Costs* | Adjusted Opportunity Costs* | Adjusted Annual Earnings Benefits* | Adjusted Minimum Wage* |
|---|---|---|---|---|---|---|---|---|---|
| 1971 | 2015 | 12500 | | | 102.9 | 2385 | 14796 | | |
| 1972 | 1750 | 12575 | | | 106.0 | 2011 | 14449 | | |
| 1973 | 1500 | 12640 | | | 121.8 | 1500 | 12640 | | |
| 1974 | | | 18360 | 4080 | 152.0 | | | 14712 | 3269 |
| 1975 | | | 19140 | 4560 | 204.0 | | | 11428 | 2723 |
| 1976 | | | 19980 | 4560 | 225.7 | | | 10782 | 2461 |
| 1977 | | | 22380 | 4560 | 252.4 | | | 10800 | 2201 |
| 1978 | | | 23460 | 4560 | 302.7 | | | 9440 | 1835 |
| 1979 | | | 24240 | 5280 | 352.8 | | | 8369 | 1823 |
| 1980 | | | 25320 | 5280 | 425.6 | | | 7246 | 1511 |
| 1981 | | | 38520 | 5280 | 487.6 | | | 9622 | 1319 |
| 1982 | | | 39840 | 6500 | 498.4 | | | 9736 | 1588 |
| 1983 | | | 41160 | 6500 | 647.3 | | | 7745 | 1223 |
| 1984 | | | 54060 | 7500 | 871.9 | | | 7552 | 1048 |
| 1985 | | | 55680 | 12500 | 927.5 | | | 7312 | 1642 |
| 1986 | | | 57300 | 12500 | 1007.2 | | | 6929 | 1512 |
| 1987 | | | 77400 | 18500 | 1337.6 | | | 7048 | 1685 |

* Data adjusted for the year 1973
** Cost of living index for base year 1969

Appendix D4

Pay Scale Data:

Private Costs and Benefit Flows for Bachelor of Science General Graduates

in Tanzania Shillings (1971 - 1987)

| Year | Direct Private Costs | Oppor-tunity Costs | Annual Earnings Benefits | Minimum Wage | Cost of Living Index** | Adjusted Direct Private Costs* | Adjusted Oppor-tunity Costs* | Adjusted Annual Earnings Benefits* | Adjusted Minimum Wage* |
|---|---|---|---|---|---|---|---|---|---|
| 1971 | 2015 | 12500 | | | 102.9 | 2385 | 14796 | | |
| 1972 | 1750 | 12575 | | | 106.0 | 2011 | 14449 | | |
| 1973 | 1500 | 12640 | | | 121.8 | 1500 | 12640 | | |
| 1974 | | | 18360 | 4080 | 152.0 | | | 14712 | 3269 |
| 1975 | | | 19140 | 4560 | 204.0 | | | 11428 | 2723 |
| 1976 | | | 19980 | 4560 | 225.7 | | | 10782 | 2461 |
| 1977 | | | 22380 | 4560 | 252.4 | | | 10800 | 2201 |
| 1978 | | | 23460 | 4560 | 302.7 | | | 9440 | 1835 |
| 1979 | | | 24240 | 5280 | 352.8 | | | 8369 | 1823 |
| 1980 | | | 25320 | 5280 | 425.6 | | | 7246 | 1511 |
| 1981 | | | 38520 | 5280 | 487.6 | | | 9622 | 1319 |
| 1982 | | | 39840 | 6500 | 498.4 | | | 9736 | 1588 |
| 1983 | | | 41160 | 6500 | 647.3 | | | 7745 | 1223 |
| 1984 | | | 54060 | 7500 | 871.9 | | | 7552 | 1048 |
| 1985 | | | 55680 | 12500 | 927.5 | | | 7312 | 1642 |
| 1986 | | | 57300 | 12500 | 1007.2 | | | 6929 | 1512 |
| 1987 | | | 77400 | 18500 | 1337.6 | | | 7048 | 1685 |

* Data adjusted for the year 1973
** Cost of living index for base year 1969

Appendix D5

Pay Scale Data:

Private Costs and Benefit Flows for Bachelor of Laws Graduates

in Tanzania Shillings (1971 - 1987)

| Year | Direct Private Costs | Opportunity Costs | Annual Earnings Benefits | Minimum Wage | Cost of Living Index** | Adjusted Direct Private Costs* | Adjusted Opportunity Costs* | Adjusted Annual Earnings Benefits* | Adjusted Minimum Wage* |
|---|---|---|---|---|---|---|---|---|---|
| 1971 | 1750 | 10500 | | | 102.9 | 2071 | 12429 | | |
| 1972 | 1500 | 10575 | | | 106.0 | 1724 | 12151 | | |
| 1973 | 1500 | 10615 | | | 121.8 | 1500 | 10615 | | |
| 1974 | | | 17040 | 4080 | 152.0 | | | 13654 | 3269 |
| 1975 | | | 17700 | 4560 | 204.0 | | | 10568 | 2723 |
| 1976 | | | 18360 | 4560 | 225.7 | | | 9908 | 2461 |
| 1977 | | | 22380 | 4560 | 252.4 | | | 10800 | 2201 |
| 1978 | | | 23460 | 4560 | 302.7 | | | 9440 | 1835 |
| 1979 | | | 24240 | 5280 | 352.8 | | | 8369 | 1823 |
| 1980 | | | 25320 | 5280 | 425.6 | | | 7246 | 1511 |
| 1981 | | | 38520 | 5280 | 487.6 | | | 9622 | 1319 |
| 1982 | | | 39840 | 6500 | 498.4 | | | 9736 | 1588 |
| 1983 | | | 41160 | 6500 | 647.3 | | | 7745 | 1223 |
| 1984 | | | 54060 | 7500 | 871.9 | | | 7552 | 1048 |
| 1985 | | | 55680 | 12500 | 927.5 | | | 7312 | 1642 |
| 1986 | | | 57300 | 12500 | 1007.2 | | | 6929 | 1512 |
| 1987 | | | 77400 | 18500 | 1337.6 | | | 7048 | 1685 |

* Data adjusted for the year 1973
** Cost of living index for base year 1969

Appendix D6

Pay Scale Data:

Private Costs and Benefit Flows for Bachelor of Science Engineering Graduates

in Tanzania Shillings (1970 - 1987)

| Year | Direct Private Costs | Opportunity Costs | Annual Earnings Benefits | Minimum Wage | Cost of Living Index** | Adjusted Direct Private Costs* | Adjusted Opportunity Costs* | Adjusted Annual Earnings Benefits* | Adjusted Minimum Wage* |
|---|---|---|---|---|---|---|---|---|---|
| 1970 | 1750 | 12500 | | | 101.5 | 2100 | 15000 | | |
| 1971 | 2015 | 12500 | | | 102.9 | 2385 | 14796 | | |
| 1972 | 1750 | 12675 | | | 106.0 | 2011 | 14564 | | |
| 1973 | 1500 | 18840 | | | 121.8 | 1500 | 18840 | | |
| 1974 | | | 22310 | 4080 | 152.0 | | | 17877 | 3269 |
| 1975 | | | 23400 | 4560 | 204.0 | | | 13971 | 2723 |
| 1976 | | | 24240 | 4560 | 226.7 | | | 13081 | 2461 |
| 1977 | | | 32100 | 4560 | 252.4 | | | 15490 | 2201 |
| 1978 | | | 33180 | 4560 | 302.7 | | | 13351 | 1835 |
| 1979 | | | 34320 | 5280 | 352.8 | | | 11849 | 1823 |
| 1980 | | | 37800 | 5280 | 425.6 | | | 10818 | 1511 |
| 1981 | | | 46920 | 5280 | 487.6 | | | 11720 | 1319 |
| 1982 | | | 48540 | 6500 | 498.4 | | | 11862 | 1588 |
| 1983 | | | 49680 | 6500 | 647.3 | | | 9348 | 1223 |
| 1984 | | | 59400 | 7500 | 871.9 | | | 8298 | 1048 |
| 1985 | | | 60480 | 12500 | 927.5 | | | 7942 | 1642 |
| 1986 | | | 61980 | 12500 | 1007.2 | | | 7495 | 1512 |
| 1987 | | | 80400 | 18500 | 1337.6 | | | 7321 | 1685 |

* Data adjusted for the year 1973
** Cost of living index for base year 1969

Appendix D7

Pay Scale Data:

Private Costs and Benefit Flows for Bachelor of Science Agriculture Graduates

in Tanzania Shillings (197' - 1987)

| Year | Direct Private Costs | Oppor-tunity Costs | Annual Earnings Benefits | Minimum Wage | Cost of Living Index** | Adjusted Direct Private Costs* | Adjusted Oppor-tunity Costs* | Adjusted Annual Earnings Benefits* | Adjusted Minimum Wage* |
|---|---|---|---|---|---|---|---|---|---|
| 1971 | 1015 | 12500 | | | 102.9 | 1201 | 14796 | | |
| 1972 | 1675 | 12700 | | | 106.0 | 1925 | 14593 | | |
| 1973 | 2050 | 18000 | | | 121.8 | 2050 | 18000 | | |
| 1974 | | | 19140 | 4080 | 152.0 | | | 15337 | 3269 |
| 1975 | | | 19980 | 4560 | 204.0 | | | 11929 | 2723 |
| 1976 | | | 20580 | 4560 | 225.7 | | | 11106 | 2461 |
| 1977 | | | 22380 | 4560 | 252.4 | | | 10800 | 2201 |
| 1978 | | | 23460 | 4560 | 302.7 | | | 9440 | 1835 |
| 1979 | | | 24240 | 5280 | 352.8 | | | 8369 | 1823 |
| 1980 | | | 25320 | 5280 | 425.6 | | | 7246 | 1511 |
| 1981 | | | 38520 | 5280 | 487.6 | | | 9622 | 1319 |
| 1982 | | | 39840 | 6500 | 498.4 | | | 9736 | 1588 |
| 1983 | | | 41160 | 6500 | 647.3 | | | 7745 | 1223 |
| 1984 | | | 54060 | 7500 | 871.9 | | | 7552 | 1048 |
| 1985 | | | 55680 | 12500 | 927.5 | | | 7312 | 1642 |
| 1986 | | | 57300 | 12500 | 1007.2 | | | 6929 | 1512 |
| 1987 | | | 77400 | 18500 | 1337.6 | | | 7048 | 1685 |

* Data adjusted for the year 1973
** Cost of living index for base year 1969

Appendix D8

Pay Scale Data:

Private Costs and Benefit Flows for Doctor of Medicine Graduates

in Tanzania Shillings (1969 - 1987)

| Year | Direct Private Costs | Opportunity Costs | Annual Earnings Benefits | Minimum Wage | Cost of Living Index** | Adjusted Direct Private Costs* | Adjusted Opportunity Costs* | Adjusted Annual Earnings Benefit..* | Adjusted Minimum Wage* |
|---|---|---|---|---|---|---|---|---|---|
| 1969 | 1750 | 12500 | | | 100.0 | 2131 | 15225 | | |
| 1970 | 1500 | 12750 | | | 101.5 | 1800 | 15300 | | |
| 1971 | 2015 | 16500 | | | 102.9 | 2385 | 19531 | | |
| 1972 | 2015 | 17000 | | | 106.0 | 2315 | 19534 | | |
| 1973 | 1000 | 20500 | | | 121.8 | 1000 | 20500 | | |
| 1974 | | | 25320 | 4080 | 152.0 | | | 20289 | 3269 |
| 1975 | | | 26400 | 4560 | 204.0 | | | 15762 | 2723 |
| 1976 | | | 27420 | 4560 | 225.7 | | | 14797 | 2461 |
| 1977 | | | 32100 | 4560 | 252.4 | | | 15490 | 2201 |
| 1978 | | | 33180 | 4560 | 302.7 | | | 13351 | 1835 |
| 1979 | | | 34320 | 5280 | 352.8 | | | 11849 | 1823 |
| 1980 | | | 37800 | 5280 | 425.6 | | | 10818 | 1511 |
| 1981 | | | 46920 | 5280 | 487.6 | | | 11720 | 1319 |
| 1982 | | | 48540 | 6500 | 498.4 | | | 11862 | 1588 |
| 1983 | | | 49680 | 6500 | 647.3 | | | 9348 | 1223 |
| 1984 | | | 59400 | 7500 | 871.9 | | | 8298 | 1048 |
| 1985 | | | 60480 | 12500 | 927.5 | | | 7942 | 1642 |
| 1986 | | | 61980 | 12500 | 1007.2 | | | 7495 | 1512 |
| 1987 | | | 80400 | 18500 | 1337.6 | | | 7321 | 1685 |

* Data adjusted for the year 1973
** Cost of living index for base year 1969

APPENDIX E

RESEARCH CLEARANCE LETTER FROM THE VICE CHANCELLOR
UNIVERSITY OF DAR-ES-SALAAM
SIMILAR CLEARANCES WERE GIVEN FOR OTHER TOWNS
WHERE THE RESEARCH WAS CONDUCTED

THE UNIVERSITY OF DAR ES SALAAM

Ref: No: AB3/3(B)

Date: 18th February, 1988

Mdugu: RDD,
MOROGORO

UNIVERSITY STAFF AND STUDENTS RESEARCH CLEARANCE

The purpose of this letter is to introduce to you Prof./Dr./Mr./Mrs./Miss J.C. GALABAWA who is a Bonafide academic member of staff of the University of Dar es Salaam and who is at the moment engaged in research. Our staff members and students undertake research activities every year during the vacations. In accordance with the Resolution of the then TANU at its meeting held on the 11th March, 1972 (Min.9/TL/VI), University staff and students were granted general permission to carry out research. The University Administration was empowered by that resolution to give clearance at its discretion to its staff and students.

We request therefore to grant the above mentioned member of our University community any help that may facilitate his research objectives. All the living and travel expenses for the research project have been provided for by the University, the only help required is your permission for him to see and talk to the leaders and members of your institution in connection with his research.

The title of the research in question is: "ECONOMIC RETURNS TO INVESTMENT IN EDUCATION IN TANZANIA".

The period for which this permission has been granted is from 1st March, 1988 to 1st July, 1988 and will cover the following areas:

Should some of these areas be restricted, you are requested to kindly advise him/her/them as to which alternative areas could be visited.

In case you may require further details/information, please contact us through the telephone No. 49192 - 8.

Yours Sincerely,

H.A. KUHUNGA
VICE-CHANCELLOR

VICE CHANCELLOR
UNIVERSITY OF DAR ES SALAAM
P. O. BOX 35091
DAR ES SALAAM

c.c. Researcher
A/VC/mjt:

# APPENDIX F

COVERING LETTERS TO REGIONAL, DISTRICT AND INSTITUTION HEADS, AND TO RESPONDENTS FROM THE PRINCIPAL SECRETARY, MINISTRY OF EDUCATION, THE PRIME MINISTER'S OFFICE AND THE HEAD, DEPARTMENT OF EDUCATION, UNIVERSITY OF DAR-ES-SALAAM

UNITED REPBULIC OF TANZANIA

Cables: ELIMU, DAR ES SALAAM
Telephone 27903 & 27211
In reply please quote:
Ref. No. EDI A 3/10/RP/22

MINISTRY OF EDUCATION
P. O. BOX 9121
DAR ES SALAAM.



Date 3rd March, 1988

The Principal/Headmaster/Headmistress,
.....
.....
.....
.....

Dear Sir/Madam,

RE: ECONOMIC RETURNS TO INVESTMENT IN EDUCATION IN TANZANIA

Mr. Justinian Galabawa of the Department of Education, University of Dar es Salaam is conducting the above mentioned study in some institutions in the country yours being one of them. He will consult/interview tutors/teachers to get the relevant information for the completion of the study.

The Ministry of Education fully supports the study and asks you and your staff to cooperate with him to provide the necessary and relevant information so that he can accompliah the objectives of the study.

It is my hope that you will meet his expectations.

Yours sincerely,

E. B. Temu,
for PRINCIPAL SECRETARY
or PRINCIPAL
MINISTRY OF ...

JAMHURI YA MUUNGANO WA TANZANIA

OFISI YA WAZIRI MKUU NA MAKAMU WA KWANZA WA RAIS

MKOA WA ARUSHA
Anwani ya Simu: Regcom.
Simu Nam'sari: 2270-4.
Unaroijibu tafadhali taja:
Kumbukumbu Nambari RC/AR/M5/5 Vol.III/82

Ofisi ya Mkuu wa Mkoa,
Sanduku la Posta 3050,
Arusha.

31 Machi, 1988

KWA YE YOTE ANAYEHUSIKA:

YAH: UTAFITI KATIKA NYANJA YA "ECONOMIC RETURNS TO INVESTMENT IN EDUCATION IN TANZANIA"

Napenda kuwatambulisha kwenu Ndugu Justinian Galabawa wa Idara ya Elimu katika Chuo Kikuu Dar es Salaam;

Amekuja kufanya utafiti katika Mkoa wa Arusha kuhusu fani hiyo hapo juu. Ameruhusiwa kutembelea katika Viwanda, Shule za Sekondari, Makampuni na sehemu nyingine zo zote ili mradi tu kufanikisha Utafiti huo.

Tafadhali apewe msaada atakaouhitaji na asibughdhiwe.

E.F. Chang'ah
kny: MKURUGENZI WA MAENDELEO (M)
MKOA WA ARUSHA

EFC/JLT'ri

JAMHURI YA MUUNGANO WA TANZANIA

OFISI YA WAZIRI MKUU NA MAKAMU WA KWANZA WA RAIS

MKOA WA MBEYA
Anwani ya Simu: "MKUUMKOA",
Simu ya Mdomo: 2314-18.
Unapojibu tafadhali taja:

OFISI YA MKUU WA MKOA
S.L.P. 754,
MBEYA.

Kumbukumbu Namba Ref.10/33/63

5 Aprili, 1988

Kwa Ye yote Anayehusika
Eneo la Manispaa,
Mbeya.

Yah: NDUGU J. C. GALABAWA
NA
NDUGU PIUS M. MPONZI

Tafadhali husika na somo la hapo juu.

Watajwa wanatoka Chuo Kikuu cha D'Salaam na wamekuja Mkoani hapa maalum kwa kufanya utafiti juu ya "ECONOMIC RETURNS TO INVESTMENT IN EDUCATION IN TANZANIA"

Tafadhali unaombwa kuwapokea na kuwapa kila aina ya msaada watakaohitaji ili kufanikisha utafiti huo muhimu kwa ajili ya maendeleo ya Taifa hili.

H. Mkwisu
Kny: MKURUGENZI WA MAENDELEO
MKOA WA MBEYA
for REGIONAL DEVELOPMENT DIRECTOR
MBEYA

THE DAR ES SALAAM CITY COUNCIL
P.O. Box 9084,
DAR ES SALAAM.

Ref. No.19/27 Date: 9.3.88

TO WHOM IT MAY CONCERN

Mr. J.C. Galabawa ✓

From: University of Dar es Salaam

RE: RESEARCH CLEARANCE

This is to certify that, research clearance has/have been granted to ~~Messrs~~/Mr/~~Mrs/Miss~~ J.C. GALABAWA

to conduct research in the Dar es Salaam City Council on the proposed research topic: ECONOMIC RETURNS TO INVESTMENT IN EDUCATION IN TANZANIA

This clearance is granted as from: 1ST MARCH 1988 TO 1ST JULY, 1988

and will cover areas within the Dar es Salaam City Council.

M.H. Mnyamuru,
for CITY DIRECTOR,
DAR ES SALAAM.

for: CITY DIRECTOR
Dar Es Salaam

Copy to: The Vice-Chancellor,
University of Dar es Salaam,
P.O. Box 35091,
DAR ES SALAAM.

University of Dar es Salaam
Department of Education
P.O.BOX 35048
DAR ES SALAAM

Dear Sir/Madam

Subject: Economic Returns to investment in University of Dar es Salaam Programmes

The Department of Education of the University of Dar es Salaam is conducting a special project study in order to determine the economic returns to investment in University education in Tanzania.

A Senior Lecturer in the Department, Justinian Galabawa has been entrusted with the duty of coordinating this Project. He will be assisted by several undergraduate students.

Several institutions/employers/graduates which/who have participated in the University of Dar es Salaam degree programmes will be consulted/interviewed. In this case your institution/ employees/graduates has/have been sampled for these consultations.

Our research assistant Mr/Mrs/Miss----------
---
who is holding the Vice-Chancellor's research permit on our behalf will arrive at your institution on----------
---------- at ----------
for this work.

We would be grateful if you will cooperate with us in this exercise.

Yours sincerely

Abel G.Ishumi
Professor and Head
Department of Education
University of Dar es Salaam.

AGI/liz.